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CONTENTS

Continued on page vi

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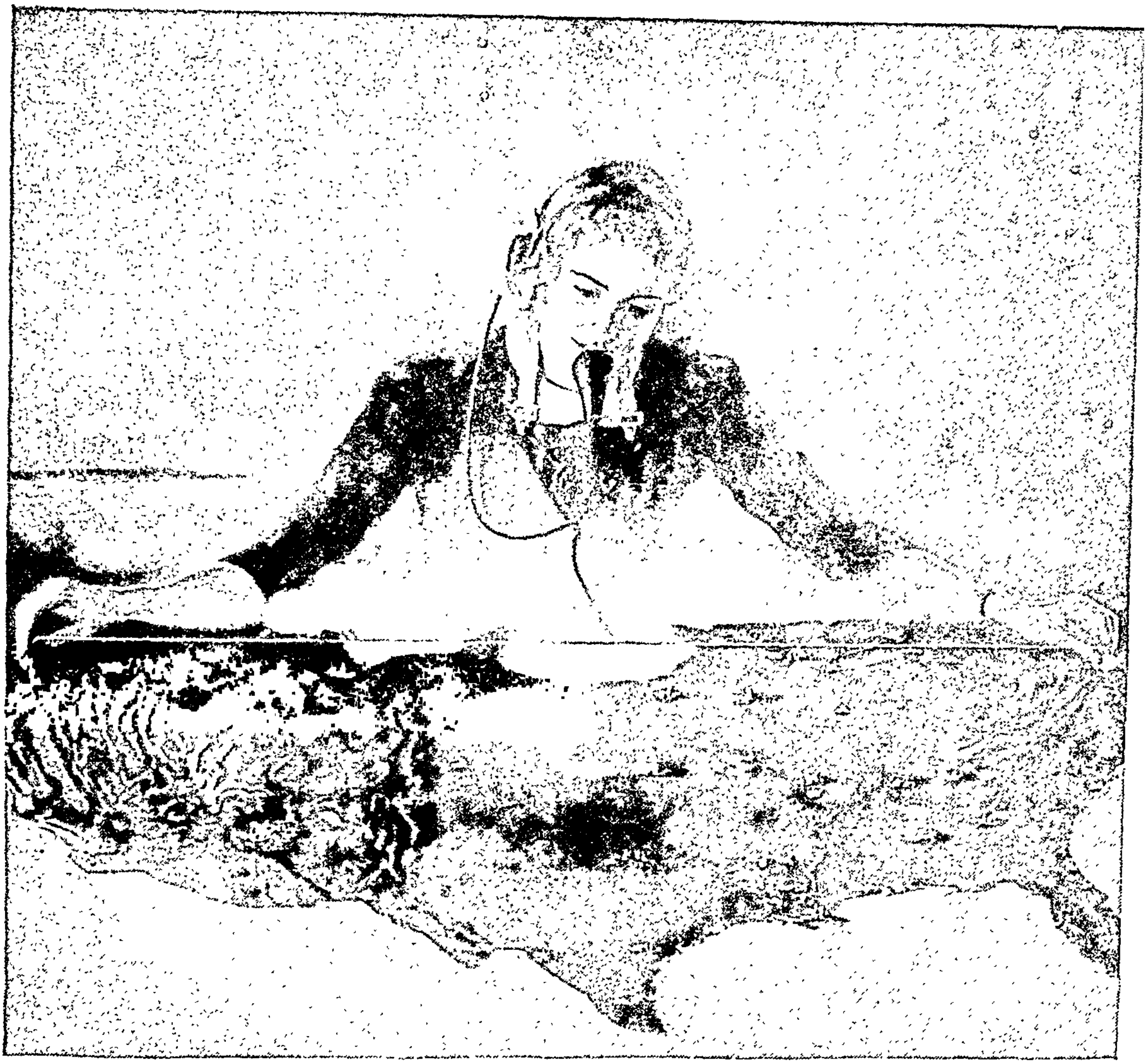
cal as well as agglutinative properties is essential to identification of members of this group. Variations in the reactions of individual strains complicate their systematic bacteriologic study. The Shiga type, which is differentiated from the others primarily on clinical grounds, is apparently also distinct antigenically. Irregularities in fermentative properties have been observed, however, especially after cultivation on artificial media. *B. dysenteriae* Sonne and *B. dispar*, if the latter is to be considered a member of this group, differ from the others in that they ferment lactose, usually slowly. *B. dispar* produces indol, a property which has not been observed in the [illegible] type. Since the latter changes [illegible] from the smooth to the rough [illegible] difficulties are encountered in securing satisfactory agglutinating serum and in identification by means of serologic tests.

A fourth type, designated as *B. dysenteriae* Schmitz, has incited a few extensive outbreaks of a comparatively mild form of dysentery in institutions in New York State.[7] This strain ferments maltose but not mannitol, produces indol, and is apparently antigenically distinct from the other types. *B. alkalescens*, although of questionable diagnostic significance, must be mentioned. Its recognition is relatively simple, since in addition to agglutination in known serum it ferments xylose, rhamnose, and dulcitol, and produces marked alkalinity in milk. There remain for consideration the Flexner group, those strains designated as B. para-Shiga (—) by Dudgeon and Urquhart[8] in 1919, and the so-called Newcastle type described by Clayton and Warren[9, 10] in 1928. Boyd,[11] who has made valuable contributions to the study of dysentery bacilli, has shown the Flexner group to be of complex antigenic structure and has stated that he believes the aerogenic Newcastle type to be a variant of this group.

In 1938, Hazen[12] reported the isolation of a microörganism, which in so far as could be determined, corresponded to that termed B. para-Shiga (—) by Dudgeon and Urquhart.[8] A strain of the latter could not be obtained for comparison however. It has recently been found that the strain isolated by Dr. Hazen is agglutinated in serum produced with the Newcastle type. This fact, together with information obtained from Dr. Hardy[13] that he had found Newcastle strains that failed to produce gas from dextrose and that fermented mannitol, has led to a study of such microörganisms. The preliminary findings indicate that a group of nonmotile Gram-negative bacilli, some of which produce gas in dextrose broth and may or may not ferment mannitol, are closely related serologically to the Newcastle type. The differentiation of these microorganisms is of academic interest, but seems of questionable import for purposes of diagnosis.

The third point to be considered is the study of new species. Isolated cases and extensive outbreaks of enteritis of undetermined etiology occur, and it may be assumed that either the methods in use are unfavorable for the isolation of the incitants or are inadequate for their differentiation from nonpathogenic species. Data regarding two species isolated in the Division of Laboratories and Research at Albany during the past few years may be of interest. Neither is considered a member of the dysentery group, but they are included here because they are apparently incitants of enteritis.

The first is a nonmotile Gram-negative bacillus that gives the reaction characteristic of the paratyphoid-enteritidis group in Russell's double-sugar medium.[14] Since it ferments lactose slowly and produces indol, it may be confused with members of the coliform group. It ferments maltose and mannitol but not xylose, rhamnose, or



A NATION UNITED BY TELEPHONE

JUST twenty-five years ago, on January 25, 1915, the first transcontinental telephone call was made.

President Wilson talked from the White House across the country, testifying to the nation's pride "that this vital cord should have been stretched across America as a sample of our energy and enterprise."

The inventor of the telephone, Alexander Graham Bell, in New York, repeated across the continent to San Francisco the first words ever heard over a telephone —"Mr. Watson, come here, I want you"—to the same Thomas A. Watson who had heard them in the garret workshop in Boston in 1876.

That ceremony ushered in transcontinental service twenty-five years ago. Then it cost $20.70 to call San Francisco from New York. Now it costs $6.50 for a station-to-station call and only $4.25 after seven in the evening and all day Sunday.

In 1915 it took about half an hour, on the average, to make a connection. Now most calls are put through without hanging up.

These are measures of progress in the never-ending effort of the Bell System to give faster, clearer, more useful and courteous service to the people of the United States.

BELL TELEPHONE SYSTEM

EMPLOYMENT SERVICE

The Association Employment Service seeks to bring to the attention of appointing officers the names of qualified public health personnel and to act as a clearinghouse on employment. This is a service of the Association conducted without expense to employer or employee.

From the registry of persons available, selected announcements are published from time to time. Appointing officers may obtain lists of all registrants on request.

The Association welcomes inquiries with regard to persons qualified, especially in the following classifications:

Administrative health officers
Epidemiologists
Public health educators
Maternal and child health physicians
Industrial hygienists
Laboratory directors

Positions Wanted

ADMINISTRATIVE

A position in epidemiology or administrative public health is desired by physician with C.P.H. from Johns Hopkins, 11 years' administrative public health experience, and excellent background of communicable disease control and school health service. A368

Administrative public health or epidemiological position is desired by well qualified physician, with M.P.H. degree, 16 years' experience as county and city health officer, and 3 years epidemiologist. A206

Physician, with M.S.P.H., now completing course for Doctor of Public Health degree, who has had 6 years' experience as public health administrator, seeks administrative position in full-time city or city-county health department. Available July 1. A367

Position in administrative public health, maternity, infancy and child health, or health education desired by physician with C.P.H. from Johns Hopkins, who has had experience in these fields. A343

Physician, M.P.H., Harvard; well experienced in city and rural health administration, will consider appointment as district health officer or in city or state health department. A418

Physician, M.D., C.P.H., experienced as district health officer, prefers to [illegible] venereal disease control work or epidemiology. A345

HEALTH EDUCATION

Well qualified woman in health education wishes position as health coördinator or health counselor. Has wide experience, and Ph.D. from New York University. H236

Position as health coördinator desired by young woman experienced teacher in health education, with M.S.P.H. from the University of Michigan. H398

Experienced teacher in public health and author; M.A., Columbia; experienced in teaching public health nursing and carrying field promotion, wishes broad opportunity to train field personnel in extending knowledge and interest to the general public, especially through group education, institutes, exhibits, and rural programs. H400

LABORATORY

Teaching, executive or administrative position desired by experienced teacher in bacteriology and public health; Ph.D., Cornell; now professor in grade A medical school. L327

Broadly experienced laboratory director, with excellent background, now employed, seeks responsible position in laboratory work or teaching of bacteriology, immunology or pathology. L426

Bacteriologist, serologist, B.S., M.A. degrees, 2 years' experience foods, dairy and biochemistry in public health laboratory, desires position in research or routine. L454

Bacteriologist, serologist, with 8 years' public health laboratory experience, desires position. L455

Young man bacteriologist, M.S., Cornell; Ph.D., Rutgers; experienced in bacteriology, water supply, sewage, dairy and general public health laboratory work, extensive research in bacteriology

Continued on page viii

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INDEX TO ADVERTISERS

American Journal of Public Health
and THE NATION'S HEALTH

Volume 30 January, 1940 Number

The National Health Program—Present Status*

ABEL WOLMAN, Dr.Eng., F.A.P.H.A.
Professor of Sanitary Engineering, Johns Hopkins University, Baltimore, Md.

A YEAR ago your speaker in his Presidential address, "A Century in Arrears," made the error of indulging in quantitative analysis of certain matters concerning the public health. A lapse of 100 years in recognition of important undertakings in the public health field was emphasized. The penalty for such an analysis was not long in coming, for today the program committee suggests that the estimates of progress or of delay be brought up to date for the past year.

The evaluation of accomplishment in a century is a far simpler assignment than the determination of the particular fronts on which real changes have occurred in a period of 12 months. Much has happened since October, 1938, but the task of assigning permanent values thereto is difficult. All that can be done today is to rehearse in as brief compass as possible what appear to be the important steps forward in discussion, legislation, or administrative accomplishment. In all these sectors the past year has been surprisingly fruitful.

* Read at a General Session on Medical Care and the National Health Program, of the American Public Health Association, at the Sixty-eighth Annual Meeting in Pittsburgh, Pa., October 18, 1939.

ACTIVITIES OF THE AMERICAN PUBLIC HEALTH ASSOCIATION

The executive board of the A.P.H.A., following the Kansas City mandate of the membership, appointed a committee of Fellows of the Association to coöperate with the Interdepartmental Committee of the U. S. Government, with the American Medical Association, with the American Dental Association, the National Organization for Public Health Nursing, the Conference of State and Territorial Health Officers, and other agencies, for the purpose of translating certain accepted principles of the Association in the national health program, into effective action, whether of an administrative or legislative character.

This committee met in Washington on November 19, 1938, at the request of Miss Josephine Roche, Chairman of the Interdepartmental Committee, for extended conference. All members of the committee were present. For purposes of the record these included: Abel Wolman, Dr.Eng., Chairman, J. N. Baker, M.D., Louis I. Dublin, Ph.D., A. T. McCormack, M.D., H. S. Mustard, M.D., John L. Rice, M.D., F. J.

Underwood, M.D., and, ex-officio, E. S. Godfrey, Jr., M.D., and Reginald M. Atwater, M.D.

Following these and other conferences, the recommendations were presented to the Executive Board of the A.P.H.A. for acceptance. Such acceptance has since been granted. The recommendations are here repeated without the supporting data which the committee presented, but which may be found in the official records of the Association.

1. It is certainly theoretically desirable that a single state agency should be made administratively responsible for carrying out all the provisions of the National Health Program which may be enacted into law.

2. In the initiation and development of the program, wide latitude should be given to the states in the definition of the population to be served, in the selection of the method of providing medical service, and in other important phases of the proposed program. We believe that similar latitude should be provided with regard to the method of raising funds in the states to accomplish approved objectives.

3. The fundamental objectives involved are, first, conservation of health and vitality and, second, reduction of the rôle of sickness as a cause of poverty and dependency. With this in mind, it supports the concept that Recommendations 1, 2, and 3 of the Interdepartmental Committee (the expansion of public health and maternal and child health services, the expansion of hospital, clinic, and other institutional facilities, and the provision of medical care for the medically needy) should have priority in initiation.

4. Recent experience demonstrates that the Social Security Act provisions for aid to the states for health work provide a suitable framework for the expansion of preventive health services.

5. Any state program to be approved for federal aid should contain adequate provisions for the maintenance of high personnel standards and that payment of such federal aid to state agencies should be withheld when it is found that substandard services are being furnished. Similar policy should obtain with respect to state aid to local areas within a state. The appropriate federal administrative authorities should have power to establish minimum standards through rule and regulation after consultation with competent advisory professional bodies.

6. Careful study will be necessary to perfect administrative regulations to cover the details concerned with the provision of medical services, so as to assure a high level of quality. We believe that standards of medical practice should not be written into basic law. Federal aid should be conditioned on inclusion within the state plans of adequate safeguards for maintaining appropriate standards.

7. The extension and improvement of public health services in general throughout the country requires complete integration of health services of the federal government under one cabinet officer, preferably a Secretary of Health.

During 1939, the Association continued sessions with key representatives of a number of the federal and state agencies interested in the development of the National Health Program. These culminated in the appearance of your President before the Senate Committee on Education and Labor on May 4, 1939, to present a statement of the position of the American Public Health Association with reference to the National Health Bill of 1939, S. 1620. A summary of that statement appears in the JOURNAL of the Association for June, 1939, pages 686 to 688, inclusive.

The Association approved in principle the major aspects of the National Health Program. It pointed out, however, important details or principles in which the proposed legislation differed from the principles accepted and already enunciated by the Association. The essential agreements and exceptions noted in this statement are not again recorded here, for they may be read in detail in the JOURNAL already referred to and in amplification in the testimony before the Senate Committee, now available in printed form.

CONGRESSIONAL ACTION

Although several acts affecting the program for improvement of the public health of the nation were introduced into the Congress during 1939, the most significant and comprehensive of these is Senate Bill 1620, providing for the general welfare by enabling the several

states to make more adequate provision for public health, prevention and control of disease, maternal and child health services, construction and maintenance of needed hospitals and health centers, care of the sick, disability insurance, and training of personnel. The bill was introduced in the Senate by Senator Robert F. Wagner of New York on February 28, 1939.

The National Health Bill translated into concrete legislation the recommendations for action which had been developed from some years of inquiry. It extends the procedure of grants-in-aid developed in various titles of the Social Security Act, on the assumption that this procedure permitted the widest latitude to the states in the development of their own plans consistent with the needs of their own people. The bill further provided grants to establish, expand and improve state programs for

a. Child and maternal health
b. General public health services and investigations
c. Construction of needed hospitals and health centers
d. General programs of medical care
e. Insurance against loss of wages during periods of temporary disability

The administration of the purposes of the Act is vested in the existing federal agencies: The Children's Bureau, the Public Health Service, and the Social Security Board.

The bill does not establish a system of health insurance, or require the states to do so. Although the bill does not include such a program, common assumption that it does still persists.

The financial implications of the proposed act are briefly set forth in Table 1. A review of this table indicates that the present 1938 authorizations for health purposes under the Social Security Act are approximately $17,000,000. The proposed authorization under S. 1620 for the fiscal year 1940, was $98,250,000. An authorization should be distinguished from an appropriation, since the former is an indication of Congressional intent, while the latter is a statement of budgetary allotment. In other words, the authorizations suggested in S. 1620, even if this bill had been passed, would have to be translated into appropriations by subsequent Congressional and budgetary action. The authorized and the appropriated amounts are rarely the same.

The proposed legislation rests upon an agreed need for a national health program in which the following assumptions were dominant:

1. The health of the people is a matter of public concern.
2. Ill health is a major cause of suffering, economic loss, and dependency.
3. Good health is essential to the security and progress of the nation.

PRELIMINARY REPORT FROM THE COMMITTEE ON EDUCATION AND LABOR

The Committee on Education and Labor of the Senate appointed a sub-committee to study the bill. This sub-committee held numerous public hearings in which a large volume of testimony and supplementary information was acquired. The committee on August 4, 1939, reported that it is in agreement with the general purposes and objectives of S. 1620. It wished to give this legislation, however, additional study and to consult further with representatives of lay organizations and of the professions concerned. The sub-committee intends to report out an amended bill at the next session of Congress convening in January, 1940.

The report of the sub-committee released in August, 1939, as Report No. 1139, is replete with important observations on many of the accepted and controversial features of the National Health Program. The document deserves careful review and analysis by every individual interested in public health progress in the United States.

TABLE 1

Present Appropriations for Health Purposes under the Social Security Act and Appropriations Proposed to Be Authorized by S. 1620

Purpose	*Present Authorization under the Social Security Act*	*Proposed Authorization under S. 1620*[1] *Fiscal Year 1940*
Title V:		
Part 1: Maternal and child health services	$3,800,000	$ 8,000,000
Part 2: Medical services for children, including crippled children	2,850,000	13,000,000[3]
Part 5: Administration, investigations and demonstrations, etc.	425,000	2,500,000
Title VI—Public Health work and investigations:		
Part 1:		
Payments to States	8,000,000	15,000,000
Administration, studies, demonstrations, etc.		1,500,000
Part 2: Investigations	2,000,000	3,000,000
Title XII:		
Grants for general hospitals		8,000,000
Grants for mental and tuberculosis hospitals		(2)
Administration, etc.		
Public Health Service		1,000,000
Public Works Administration (etc.)		(2)
Title XIII:		
Grants for medical care		35,000,000
Administration		1,000,000
Title XIV:		
Grants for temporary disability compensation		10,000,000
Administration		250,000
Total	$17,075,000	[4] $98,250,000

1—These amounts replace, and are not additional to, the amounts authorized by the Social Security Act.
2—A sum sufficient to carry out the purposes of (this part of) this title.
3—Of which $4,000,000 in the fiscal year 1940, $5,000,000 in the fiscal year 1941, and so much as the Chief of the Children's Bureau deems necessary in succeeding years, are to be allotted "for service to crippled children and other physically handicapped children in need of special care."
4—Total of limited expenditures authorized.

Even a brief summary of all of the features of the report would be impracticable of presentation today. One cannot escape, however, the temptation to record some of the outstanding observations in the report. The speaker takes the liberty of quoting some of the more striking comments below:

1. "The evidence on needs, in urban and in rural areas, is overwhelming, as may be evident to anyone who will examine the record.

2. "There are various factors which explain why large proportions of the population fail to receive the medical and health services they need. So far as community services are concerned, there is often a lack of understanding or experience as to the benefits to be derived from public health and related services and, perhaps more important, there is lack of financial resources. So far as services for individuals are concerned, there is, among other factors, ignorance as to the benefits of modern medical care, reliance upon unsuitable methods of care, distance from practitioners and facilities, etc. But while these particular factors play a part in the case of services for individuals, we are convinced from the evidence placed before us that the major reason is lack of financial ability on the part of large proportions of the population—as individuals, as groups, or as members of committees—to meet the costs of needed services.

3. " The fact that a considerable proportion of general hospitals are being used to far less than their capacity in some places does not alter the basic need for additional facilities, or for facilities within the financial resources of particular groups of people, in other communities.

4. " The irregular and unpredictable occurrence of sickness, and consequently of expenses for medical treatment, tends to create a new class of dependent or needy persons, so that, in addition to the indigent, people everywhere are beginning to characterize a large proportion of our population as the 'medically indigent' or the 'medically needy.' These are persons who are self-supporting in every respect except as regards need for elaborate or expensive medical care; they include tens of millions of people, on farms and in cities, above the relief level. Yet, though these are people who need no public assistance for their ordinary support, their health and medical needs are as much the concern of Government as are the needs of the indigent.

5. " The long history of this subject shows that these problems do not solve themselves by being ignored; neither do they cease to exist by being either ignored or denied. Nor, as a long history of special studies makes plain, are these problems new or the result of an economic depression. They were with us in the 1920's, as Dr. Wilbur's Committee on the Costs of Medical Care fully recognized, and they are still with us today. These problems must be faced squarely and solved on a basis which not only safeguards the quality of medical care but also preserves the dignity and self-respect of the people who are to be served.

6. " There is no escaping the fact that the costs of sickness are a heavy burden on large portions of our population, that modern medical care is of necessity elaborate and expensive in many cases of serious illness, that the costs may be out of reach for people with small incomes, and that the burden should not be left so largely on the practitioners, hospitals, and voluntary organizations as it is today. We must provide substantial solutions, as we believe we can, which will be beneficial alike to patients, to the entire public, to practitioners, to the hospitals, and to the related institutions and organizations.

7. " This bill does not propose a new departure or a new type of activity for the federal government. Participation in health services by the federal government is as old as the nation itself. Federal coöperation with the states in safeguarding health and strengthening state and local health services has an unbroken history of 150 years. The bill before us proposes only to lay out a long-range and systematic program on a basis for carrying on old and traditional activities in a sound and efficient manner.

8. " It is our opinion that the administration and operation of health services should be left to the local communities and to the states, and that the federal government should not control or dictate to the local communities or states in the management of these functions. But the federal government cannot be indifferent to remediable deficiencies or inadequacies in the provision of services that are necessary to health. It should take steps to aid the states and, through them, the local communities, in the provision of necessary health services to their inhabitants. The primary opportunity for the federal government is to give financial and technical aid to the states.

9. " Disease germs and the economic effects of sickness do not respect state lines. The opportunities for the spread of disease are increased by modern methods of transportation and by the mobility of population. The citizens of one state cannot be safe from communicable disease so long as such disease prevails among the citizens of other states. One state cannot stamp out tuberculosis among its people unless the disease is also stamped out in neighboring states. One state cannot meet all the costs of improved health services and cannot protect itself against the burdens of dependency caused by sickness, disability, or premature death unless other states also participate in a common effort against disease. But together, and with the aid of the federal government, an effective and concerted war can be waged against disease.

10. " A long-range health program offers a challenge not only to our humanitarian impulses but to our economic judgment; it offers an opportunity to balance the health budget of the nation.

11. " Coöperative federal-state health and assistance programs now in operation only emphasize the need for a carefully planned, well coördinated, long-range health program, adequately financed, so as to assure that we will make those efforts and expenditures that will bring the maximum return, especially in the prevention of disease and disability. It is to such a balancing of the health budget that the National Health Program and the present legislation is directed."

In addition to this brief summary of some of the committee's findings, reference should also be made to the careful

discussions which the committee devotes to such special problems as the general principle of federal aid to states, the problem of variable grants and matching proportions, the income limit of populations to be aided, the importance of medical education and research, the significance of health education of the public, the administrative provisions and difficulties with multiple federal agencies, the protection of minority population groups, the clarification of the scope of services under state plans, the eligibility of practitioners under state plans, coöperation with representative groups, clarification of the implication of the construction of needed hospitals and the important question of payment for services furnished by non-governmental hospitals and other agencies.

The general conclusions of the committee are sufficiently brief and clear to warrant repeating at this point. They are as follows:

"S. 1620 has received wide support from large and representative organizations. Its objectives are noncontroversial. Our government is dedicated to promoting the welfare of the people and the protection and improvement of health and well-being. Making available to all of the people the great life saving services which modern medicine has to offer is an objective which every right thinking citizen supports.

"The committee is convinced that federal legislation along the general lines followed by S. 1620, based upon federal-state coöperative programs, is necessary to strengthen the health services of the nation and to make provision for the progressive and effective improvement of health conditions in all parts of the country and among all groups of people. The needs are large, and an adequate program to put knowledge and skill more effectively to work will involve considerable expenditures of funds. The program must therefore be worked out with great care. We are confident that such a program can be worked out and that the expenditures will be sound national investments which will bring large returns. The rôle of the federal government should be primarily to give technical and financial aid to the states.

"A critical analysis of the present provisions of S. 1620 shows a number of points at which its specific purposes can be more clearly stated and its provisions improved. The committee has not yet reached any conclusions concerning the precise rate at which federal appropriations should be increased, but the committee is agreed on the general principle that the proportion of federal assistance should be greater to those states in which there is the greatest need for the services contemplated under the bill. The committee is prepared to augment the provisions of the bill—if additional provisions are needed—to assure that the amount of federal assistance would in no instance be in excess of clearly demonstrated need.

"Some misunderstandings seem to have arisen, and criticisms have been expressed concerning parts of the bill. Some witnesses have assumed that it would bring about revolutionary or dangerous changes in medical care. We think these fears are unwarranted, but we will welcome further suggestions as to specific amendments which may safeguard the objectives of the bill. Medical science has reached a commendable status in this country. The bill should encourage the further evolutionary development of medical science, teaching, and practice."

ADDITIONAL STEPS FORWARD

In reviewing the present status of the National Health Program, it is surprising to discover the number and variety of steps which have been taken during the past year to extend and to facilitate public health and medical care practices by official and nonofficial agencies.

A number of the states have developed administrative procedures in the fields of public health, medical care, and hospitalization, particularly for the medically needy, which represent advances in a single year comparable with those made in several decades preceding. It is impracticable to record each of the areas in which these activities are rapidly moving forward, but they extend from the Atlantic to the Pacific coast. Many of them have no doubt been stimulated by discussions before the American Public Welfare Association, the American Public Health Association, the American Medical Association, the

American Hospital Association, and other groups interested in the subject.

The provisional drafts of material on "The Administration of Tax Supported Medical Care" informally discussed by the American Public Welfare Association, have given great impetus to the adoption of sound principles and practices throughout the country, particularly in the field of providing medical service for the indigent.

In those states where actual extensions and improvements in practice have *not materialized, serious consideration* is being given by public health, medical, and lay groups to the entire problem. In the State of Maryland, for example, during this past summer the Medical and Chirurgical Faculty has suggested to the State Planning Commission the creation of a continuing committee to concern itself with the problems of medical care and to formulate from time to time recommendations for better utilization and for extension of existing medical facilities, and for the institution of new facilities as they are required. The Faculty emphasizes its use of the term "Medical Care" in an inclusive sense to cover all the agencies available in safeguarding and improving the health of the people and in the treatment of disease.

The Faculty, in its proposal, recognized that "Although Maryland is fortunate . . . in her wealth of medical facilities and in the average high level of medical care which her citizens receive, yet this committee will quickly become aware of many urgent needs for improvement.

"Among the deficiencies in the present system of medical care in Maryland the following may be cited as outstanding examples:

"1. The lack of facilities for hospital care for Negro patients in the counties.

"2. The lack of adequate support for the out-patient departments of city and county hospitals.

"3. The lack of funds or organization for the medical care in their homes of those upon *relief* and for other classes of indigent patients.

"4. The lack of facilities for postgraduate education for practising physicians.

"5. The inadequate buildings, equipment, and budget of certain county hospitals.

"6. The lack of beds in the counties for the care of chronically disabled patients.

"7. The lack of adequate accommodations for existing institutions for the feebleminded, especially among the colored race.

"These urgent needs are cited merely as instances of some of the problems which demand solution."

The State Planning Commission of Maryland has agreed to the formation of such a committee on medical care, has recommended such a committee to the Governor, and steps are now under way toward its organization.

The method of approach used in Maryland is presented only as an example of the great interest which has been aroused in health as an element in social security. It is gratifying that in these efforts during the past year, the members of the medical profession have taken a leading and coöperative part, although the American Medical Association in its 22 objections to the Wagner Act still bases its militant contribution to the development of a sound national program upon the negative thesis of "all is well in the public health and medical field."

STOCK TAKING

Even this necessarily cursory review of the present situation in the public health field discloses that the national health program has advanced far and fast in the characteristically democratic experimental fashion with which we are familiar in this country. Innumerable approaches to the problem and to its solution have been developed at the various levels of government, with the earnest and helpful support of lay and professional groups. All of the undertakings, prospective, potential and actual, augur well for the future.

In March, 1939, your present speaker ventured a prophecy before the New York Tuberculosis and Health Association. Of the four elements implicit in that prophecy all have moved forward in an unexpectedly rapid though uneven formation during less than seven months.

That prophecy rested upon the concept, paraphrased aptly by Surgeon General Parran in his testimony before the Senate Committee on Education and Labor:

> "In connection with balancing the budget, Mr. Chairman, I hope that this Congress will give more attention to balancing our health budget. It is cheaper to keep a woman from dying in childbirth than to take care of the orphans in an orphan asylum or to give aid to the dependent children. It is cheaper to aid in building tuberculosis sanatoriums than it is to pay for the death from tuberculosis and the widows and children who are left. The State Health Officer of Tennessee estimates that it costs on the average of $150 to bury a person in Tennessee, and on that basis it is costing that state more to bury people dying from tuberculosis than for its entire health program, including tuberculosis and all the other diseases."

The past year gives evidence of a number of adjustments of the American people to a changing environment, in which political, social, and economic forces, of historical and international scope, have been at play. It is not surprising that in these adjustments, public health and medical care problems, as important phenomena of this environment should come in for their share of discussion and experiment. People have long accepted the principle that in respect to public health no distinction should be made between the rich and the poor. Now they really want to put it into effect. Can we meet the challenge of economics, as we have always tried to meet the humanitarian one? The next ten years will give the answer. I, for one, feel it will be met!

The Physician's Part in Organized Medical Care*

HAVEN EMERSON, M.D., F.A.P.H.A.

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IN a recent contribution to international relations among men of science, that wise and constructive university president, Dr. Isaiah Bowman, quotes some opinions of distinguished contemporaries, from among which the following two may serve a useful purpose here as introduction to the ideas I offer to this meeting:

"Sentiment and emotion have their places in the evolution of society from lower to higher, but in themselves are fallacious guides"; and again, "In these days of exaggeration, when mere political mechanisms tend to be worshipped as golden calves, the scientist at least knows that there is no collective salvation of souls and no final order. It is the business of science to discover truth, not salvation."

We of the A.P.H.A. are trying to apply our command of the facts of the sciences of preventive medicine for the benefit of our fellow beings, and some of us fear that ambition to achieve collective salvation has crowded science to one side. It would seem appropriate for our organization to look at the social programs urged upon the American public as tentative and hypothetical until they have been subjected to the scientific method.

Physicians generally recognize some maldistribution of the care of the sick and of public health service, mostly for reasons similar to those which determine other unevennesses in availability of the necessities for a good way of living. We know that quality of medical service as delivered does not always equal the best that can be had. We believe poverty and sickness are not recent emergencies, but chronic and perhaps permanent conditions of society worthy of every useful effort toward prevention and relief.

Three major factors affect unfavorably the distribution, quantity, and quality of medical care: (1) low earnings in terms of spendable cash income among unskilled wage earners and other persons of a low economic level of self-support; (2) unemployment of employable persons capable of self-support if there were a demand for their services; (3) lack of payment, in proportion to services rendered to the sick, by government, whether local, state, or federal, for free medical care of indigent persons contributed by the several medical professions, through individuals or organizations.

Extensive overcrowding of those particular medical institutions operated by government for mental and tuberculosis patients and for the feebleminded, and lack of full utilization of many general hospitals under voluntary auspices,

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constitute the chief dislocations or disproportions between needs and facilities for the sick by medical institutions.

Health departments of local and state jurisdictions with but rare exceptions fall far short of their potentialities to prevent disease and protect and promote health through the exercise of those common functions almost everywhere authorized by law, and long recognized as requiring specially qualified professional direction. Of the two major factors responsible for this unsatisfactory state of public practice of the sciences of preventive medicine, namely low per capita appropriation for health services and unqualified leadership and direction, the latter appears the more serious and the more readily remedied.

Of the several essentials of a life tolerable at the low level of the still self-supporting wage earner, and of persons even less fortunate, it would seem that medical care of sickness when needed and sought is more nearly sufficient in amount and character in this country than are any of the others. The discrepancy between need for, and supply of, medical care is less and its quality better in the United States than elsewhere.

We are concerned that persons be not denied medical care that they need and seek, for the only reason that they cannot at the moment command by cash payments such skills as their illness requires. Many experiments are under way to reduce such failure to meet the needs of the sick by ingenuity of thrift and medical adaptation. Among these are instances of success, whether measured by patients, physicians, or civil government.

By suitably phrased definitions one may readily and honestly come to the opinion that everyone lacks some medical service which might do him good. It is difficult indeed to discover anyone whose body and mind are so sound as to offer no opportunity for the benefits of medical advice.

There are defects and inadequacies of service for sickness and for health, some widespread, others sharply localized or regional, but none more serious than those corrected in the past, and by methods applicable now as then.

I venture to remind you of the Official Declaration of Attitude of the American Public Health Association on Desirable Standard Minimum Functions and Suitable Organization of Health Activities,* formally adopted at our meeting six years ago in Indianapolis. I think you will agree with me that there is nothing in this declaration, or I believe in any other made by our Association, which accepts responsibility for or charges us with the duty of including organized care of general sickness as a function of health departments, whatever their area of jurisdiction.

No new, unforeseen, or unfamiliar situation has arisen to threaten the health of our people, but rather a warning has been voiced that as a nation we are extravagant in the creation and destruction of human life as we are wasteful of the immense endowment of nature to which we became heirs more by accident than otherwise on this continent. Of all the factors dealt with by economists and sociologists, those of the health status and medical needs of the public are likely to remain for a long time the most precisely calculable and predictable.

The physician of the United States will probably continue to hold as desirable, voluntary, personal, economic, and professional relationship between doctor and patient, reliance upon administration of social policies consistent with our traditional form of representative government, confidence in the competence of the individual local tax-paying citizen to determine wise objects of tax

* *American Public Health Association Year Book, 1933–1934,* p. 6.

expenditure by local and state government, dependence upon a central federal health agency to supplement the services of local government as needed with technical and financial resources.

Even now after more than a half century of organized professional and governmental development of public health services, in but few respects and in but rare, fortunate, and scattered communities can the services of official health agencies in their own particular fields compare in quality and results with those commonly achieved in diagnosis and treatment of the sick in the voluntary and city or county general hospital, and by the independent self-supporting private practitioner of medicine.

Lest we waste thought and word, in discussion, unprofitable because of lack of primary definitions, let us accept common use of terms.

By organized care of the sick, let us mean the use of physicians and members of associated professions through institutions or agencies created by philanthropy, by government, by the medical professions, or by groups of other persons related through some common purpose, opportunity, or need.

A distinction between the care of the individual sick and public health services is that for the latter, effective use of much of our knowledge of preventive medicine calls for authority and some measure of compulsion. The major objectives of a health department are obtained in a large way by their effects upon groups, classes, or communities of people rather than upon individuals, and the burden of their provision is accepted as that of the tax-paying public.

As to personal care of the sick there cannot under our present laws and folk-ways be any compulsion except for the mentally irresponsible or in the management of certain conditions of communicable disease. The results of medical treatment of the individual depend largely and sometimes wholly on individual participation and desire by the patient for personal recovery, and the cost of this service has generally fallen upon the patient or his family, except in instances of poverty.

Preventive medical care has always been a part of the individual care of persons and families by physicians, while sickness is under treatment, in intervals between illnesses, and particularly during periods of development and growth such as maternity and childhood.

So much of our knowledge of preventive and curative medicine as can best be applied by the untrammelled voluntary paid relationship between the patient and the physician of his choice should be so carried on in the interest of the quality, quantity, and availability of service. So much of our control over preventable diseases as can only or best be done by public authority and tax resources should be carried on by government with the widest practicable participation by the individual practitioner of medicine.

The cost and intricacies of equipment and the skills required for good modern diagnosis and treatment of the sick have made the hospital indispensable as a shop for the individual practice of medicine, as well as for the humane care of the sick poor whose homes and resources do not permit suitable medical and nursing attention otherwise.

Public health services have been variously defined and it would be unwise for either a professional association of workers in this field, or government, or the community to be bound by any present form or phrase, or to refrain from change or expansion of services for any such formal reason as a definition contemporarily accepted.

What has seemed to me to be a sound and sufficient definition of public health service is the application of the sciences

of preventive medicine through government for social ends. While nonofficial health agencies are not part of government, they are responsible through their privilege of incorporation and tax exemption to government. Public health work as conceived under the definition offered is always the activity of an institution or agency of government serving social (that is, group or communal) rather than personal ends by the use of our knowledge of preventive, and, if you will, creative as well as protective medicine. Such a definition excludes from the field of public health, and I believe properly so, the extensive field of care of the sick. It seems to me to be likely to conduce to clarity of thought and precision of plan if we distinguish between organized care of the sick and public health, if for no other reason than that the specialized professional upbringing and experience of those in charge of services for the sick are in the main quite different from those of the officer of health.

Care of the sick includes much personal preventive service, which is certainly not given for a public purpose, although the end product is a better average health within the public body.

Organized medical care, then, with which we are dealing at the moment, includes care of the sick by institutions and agencies and the medical aspects of public health services.

There is an orderly and sound traditional relationship between physicians and the administration of institutions and agencies for the sick that has stood the test of time and has given solid satisfaction and results. This is best exemplified by the several functions and mutual relationships of the board of trustees and the medical board of the general voluntary hospital, the trustees holding the property, operating the institution through a paid administrative officer, appointing the medical board and holding it responsible for policies, methods, and results in the care of patients. The medical board and staff maintain standards of performance and professional discipline, and each member accepts personal individual responsibility for his diagnoses and treatment as he must for his services to patients elsewhere. It is under these conditions that physicians have contributed free services to non-paying patients of a money value in excess of the entire contribution of the public in taxes and donations for the hospital care of such free patients.

There is in fact only one field of organized care of the sick in which there is a widespread lack of good administration and professional direction, namely, home medical care of the indigent. Without attempting to enter upon this problem or the solutions of it undertaken here and abroad, let me refer you to the well considered reports and suggestions of the American Public Welfare Association, particularly its discussion of administrative organization and the conclusions and recommendations contained in its *Report on Medical Care* of June 1, 1938. The main and proper concern of physicians in this phase of organized medical care includes the quality of diagnostic and therapeutic skill provided, the administrative control of and the basis of payment for the professional services. The attitude of all responsible medical groups on this is the same though the methods of solution proposed vary in minor aspects.

Of all the multifarious problems involved in improving the present resources and methods for care of the sick by institutions and agencies, two have roused particular public concern, namely, the difficulty of the self-supporting wage earner or other employed person of small means in meeting the cost of medical service out of his individual savings or earnings, and the medical care of indigent persons.

Two methods have been developed with some success to facilitate thrift and coöperative resources of people of small means to meet some at least of the costs of their medical care, prepayment plans for hospital service, and cash indemnity insurance schemes to meet wage loss and medical costs of sickness. Neither of these methods is yet so well developed as to satisfy the principal objectives. Compulsory insurance schemes to meet the cost of sickness have been urged as necessary and practical. These have been generally, and always incorrectly, referred to as " health insurance " schemes. There is no such thing as " health insurance " in any honest, actuarial, financial, social, or medical sense of the words. The term " health insurance " is a charlatan's slogan used to catch political " suckers." There seem to me compelling reasons for us in this country to develop both of the former plans and oppose the latter.

There is general agreement that medical care of the indigent has never been and is not now satisfactory, on the grounds of availability, quality, methods of meeting the cost, or administrative responsibility.

It is distinctly a responsibility of the physicians of any community addressing itself to the problem of care of the indigent sick in a serious way to present its convictions on a few fundamental principles such as the following which have been widely accepted:

" Medical care is one of the necessities of life and therefore should be developed and operated with the advice of the organized medical professions (physicians, dentists, nurses and pharmacists);

" So far as possible, the opportunity to participate in the giving of this service should be open to all qualified practitioners rather than restricted to a few salaried professional employees;

" Free choice of the medical practitioner by the patient should prevail." (*Hospital Survey for New York*, Vol. II, p. 820.)

To these should be added the principle that continuity of individual medical responsibility and of record of the patient, the family and their illnesses is as indispensable for the dependent sick as for those able to command services for pay.

The essential features of an administrative system for the medical care of the indigent sick would seem to be the following:

" That medical care of the sick in their homes be included in the general program of the community for organized care of the sick, and be developed as an extension of hospital and outpatient service;

" That such care of the sick in their homes as is directly provided by governmental agencies be administered by a single governmental authority in each locality; and

" That the governmental agency to be responsible for this service be one which is primarily concerned with the care of the sick and under the immediate administrative direction of a full-time salaried physician." (*Hospital Survey for New York*, Vol. II, p. 821.)

We may find that the best official medical leadership for such organized care of the sick as is provided for out of tax funds, can be by extension of the functions of welfare departments to include this, by creation of a new department or bureau of local or state government exclusively devoted to care of the indigent sick, or by adding to the present functions of local and state health departments that of tax supported care of the sick.

In principle and for the sake of retaining the best we have achieved in public health service as a specialty of medicine, instead of diluting interest in and diverting attention from this by adding medical care, which the usual

health officer knows little about, to the functions he is now struggling to perform in a creditable manner, and not in all respects succeeding, I believe the usual health officer, whether state or local, should not be charged with the responsibility for care of the sick among the poor of the population.

It is obvious that only clinicians as individuals and as members of the staffs of medical institutions and agencies can be trusted with the diagnosis and treatment of the sick and with the preventive services to the individual patient. These must be drawn from the ranks of the practising medical profession, and those experienced in administration of institutions and agencies concerned with sickness.

What then shall physicians expect of the federal government and particularly of the U. S. Public Health Service?

Of first importance would appear to be good administrative organization at the top. The physicians of the United States whether concerned, as the great majority of them are, in personal medical care of individuals and families, or engaged in some institutions or agency of society or government, have a right to demand that the executive branch of federal government bring under a single leadership, department or bureau all federal civil functions requiring the application of the medical sciences by persons educationally qualified.

Neither the bonds that hold us together in the American Public Health Association nor the common interest of our very diverse professional and vocational elements are such as prepare us to assume any such leadership or activities as concern the care of the sick. I might go further and say that the people of the United States might well take alarm if they found that such an aggregation of persons, so unqualified by training and experience as we are in the care of the sick, should attempt to direct and execute a program of general medical care. The American Hospital Association, the American Colleges of Physicians and Surgeons, the American Medical Association, the American Dental Association, and the bodies of qualifying specialists representing the personal practice of medicine and dentistry, both preventive and curative, together with the American League for Nursing Education and the National Organization for Public Health Nursing, these are the responsible competent bodies to determine what can and must be done to better the care of the sick, but not, I believe, the American Public Health Association.

It seems to me that for the doubtful glamor of a brief emotional period of publicity we should find we had betrayed our trust, and sacrificed our distinctive position as a specialty group within the medical sciences, serving society through government for the prevention of disease and guardianship of health, if we should really do as some of our enthusiastic lay spokesmen have urged us to do, namely, take possession of the whole field of administrative medicine, care of the sick as well as public health.

It is the American Public Health Association that is at the crossroads. We must now decide whether we want to retain our professional distinction and special usefulness, or become a general utility agent for social theorists and legislative utopians who will not hesitate to work and praise us to achieve their dreams, regardless of the hazard to our future usefulness, and to our reputation as a body of competent specialists.

The physician's part in organized medical care is to be competent, and if possible expert in some special field of skill or experience.

Specialization is inherent in the elaboration of modern life and the biological sciences. It would be running contrary to experience for a specialty such as

public health to relinquish the field it has made its own for the sake of controlling others, in which its members are usually unqualified by any educational or experience criteria. If the American Public Health Association goes indiscriminate or philanthropic and tries to occupy the whole field of administrative medicine for the collective salvation of the nation, some other organization will have to be created for those physicians and colleagues of the present public health movement who wish to be associated in the application of science for prevention of disease, for the guardianship and creation of health, and for education in a biological way of living.

However much the talk of the inseparability of preventive and curative medicine, it is well to recall that in fact this desirable combination of services is effective only in the hands of the practising physician and his collaborator, the visiting nurse.

When we pass on to the level of organized, administrative services of institutions or agencies, logic and practice have distinctly separated the functions of public health from those of care of the sick, except so far as health departments demand control or offer supplementary care of persons suffering from communicable diseases, I believe this separation and specialization of functions of a medical nature to be desirable.

A central single federal health service organization with súitable personnel and resources might well undertake a survey of the national health resources, those of state and local jurisdictions. Sickness, its incidence, treatment, costs and economic implications whether of origin or neglect is not a measure of a nation's health, or of its use of authority or funds in protecting or developing health by the sciences of preventive medicine.

The U. S. Public Health Service could make no more constructive contribution to the cause of national health than to disclose to the public, by authoritative documentary evidence, the extent to which each state falls short of supplying indispensable services of known worth and cost to its population, and at the same time reveal the true causes of failure, waste, and loss of value of services due to the intervention of partisan political interests in the appointment of health officers and the conduct of the functions authorized by law.

If the Public Health Service would set for itself the task of applying the *Appraisal Form* of the American Public Health Association to the measurement of health services, as we, the independent professional body in this field, have defined and analyzed them, then indeed we might have a national health survey worthy of the name and commanding universal respect.

That would offer marching orders for city managers, common councils, boards of supervisors, mayors and governors to set their respective health houses in order and make a living reality of health services out of what is in many places a mere gesture. For our form of civil government to function, for our social forces to exercise their infinite potentialities for good, the occasion, the need, the opportunity, the origin of improvement, whether in schools, courts, fire protection, taxation, or in our chosen field of health service, must be real and local, understandable in simple language to simple people, and permit them in their usual circle of life and work to take action which will make their local government serve them better.

We need from the U. S. Public Health Service an objective, impersonal, nonpolitical, scientific statement upon the extent to which public money is now spent effectively or otherwise for health protection in each major health jurisdiction, the errors in methods, the advantage to be expected from altered ways, better trained personnel, and more adequate financial resources.

Upon such a survey each state, its legislators, executive officers and its informed citizens can build their plans for adequacy, and calculate the cost, and then determine whether their necessity is such that they can properly and honestly appeal to federal government for grants in aid to help them carry the burden of necessary local health functions.

We of the American Public Health Association and the professions and associated organizations of kindred purpose constitute the organized health conscience of the people of this country. If we allow ourselves to be swamped by assumption of functions for which we are but ill qualified, if at all, we shall sacrifice not only the distinction of our calling but public trust in our leadership.

I appeal to you to put your trust in the organization of other forces, in the medical profession in particular, to bring care of the sick up to the best performance that the state of medical science permits and the instincts of practical humanity and social ingenuity can devise, and decline to be diverted into that field, but instead to rededicate yourselves and our Association to the mission we have received from our predecessors, and make health protection and health creation our permanent and exclusive objective.

Industrial Hygiene for the Smaller Plant*

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INDUSTRIAL hygiene—the prevention and control of occupational hazards—presents the same problems for the smaller plant as it does for the large one. The lead hazard in a foundry where only 10 men are working may be just as acute as in a lead plant employing 1,000 men. And the exposure to carbon monoxide in the garage of a small candy factory is just as real as the same exposure around several coke ovens. But if these and less serious hazards do not assume the same importance in the myriad of smaller plants that they do in the larger ones, it is only because the smaller plant suffers from the lack of someone trained to recognize them and institute measures for their prevention and control.

The smaller plant—and we arbitrarily think of the smaller plant as one employing less than 500 workers—is seriously handicapped in not being able to obtain adequate help in matters of industrial hygiene. Unless the smaller plant executive has been confronted with one of the major occupational hazards it is probable that the thought of seeking the services of an industrial hygienist, an industrial physician, or even a general practitioner, has never entered his mind.

It has been found that the majority of executives of smaller plants have a rather definite desire to help in maintaining the health of their workers, but a very vague idea about how they should do it. Few of them know where to turn to enlist the services of an industrial hygienist or an industrial physician. And not many of them have seriously considered the possibility of enlisting the part-time help of the more easily available general practitioner.

The figures for the number of smaller plants in the United States which enjoy any sort of systematic medical supervision seem not to be available. In Philadelphia, a survey made in 1923 showed it to be comparatively negligible. It is justifiable to assume, however, that because the smaller plants by themselves cannot afford the full-time service of an industrial physician, those which do have medical supervision are using the part-time services of a physician engaged in some form of private practice. With the most sincere respect for the general practitioner, it has been our experience that few of them become really interested in their industrial work beyond its remunerative aspects; they are certainly not interested in the problems of industrial hygiene except where there may be present one of the classical occupational hazards. The fault, of course, lies not with the physician, him-

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self, but with those responsible for his undergraduate training.

We believe that nothing but good can come from an undergraduate course in industrial hygiene which includes a fair consideration of the practice of medicine in industry, as such, and which lays emphasis on the less serious but often more frequent occupational hazards. It is quite possible that postgraduate training in industrial hygiene will be made more easily available than undergraduate work. Definite efforts along this and similar lines are being made by the comparatively new Council on Industrial Health of the American Medical Association. At present, however, the fact still remains that the smaller plant, wherein two-thirds of the gainfully employed earn their living, find it difficult to make adequate arrangements properly to supervise the health of their workers.

For the past many years the literature on industrial hygiene has been filled with the studies and problems of inorganic dusts, carbon monoxide, and lead compounds. This seems to be perfectly natural because those compounds have been the most important as occupational hazards, but it has left the casual reader with the impression that the bulk of possible interest in industrial hygiene ends with those hazards. In the smaller plant work in Philadelphia we have felt it necessary to think of industrial hygiene in much broader terms.

Among 27 plants in which I helped to organize a medical service and served as the physician I found only one which harbored a classical hazard—a lead foundry. But I found a number of other hazards much less important, much less spectacular, but persistent enough for me to realize that they were truly the industrial hygiene problems of those particular plants, and some of these hazards were common to all of them. I refer to those frequently present hazards of extreme dry heat, heat with humidity, sudden variations in temperature, dampness, defective ventilation, defective illumination, and repeated motion. Although these hazards will probably not be found in any compensation schedule, very often they have been the direct or contributing factor in cases of lost time. And consideration of their prevention and control accounts for most of the time spent by the medical personnel on what justifiably can be called industrial hygiene.

Thinking of industrial hygiene in this broader sense, there are two reasons why these hazards of working conditions are seen with comparative frequency. First, in nearly all plants it is common to find processes which are either hot or wet or both, and rooms which must be maintained at subnormal temperatures. And second, those groups of employees entirely outside the departments of production are themselves subject to one or more of these hazards. They comprise a fair part of the plant population. They are the office workers and the maintenance group — power plant men, mechanics, electricians, carpenters, painters, and janitors; and the shippers, truck drivers, delivery men, and garage workers.

The following examples serve to illustrate a few of these frequent hazards and what we try to do about them. The men in the drying room of the tannery, working stripped to the waist during the hotter months of the year, obviously must be kept supplied with salt tablets, or, better yet, gum drops in which 10 grains of salt is dispersed. Likewise, salt must be kept available to the workers in the lard room and around the scrapple kettles in the packing plant. Almost continuous efforts to point out the wisdom of appropriate changes of clothing are made on behalf of the maintenance men going in and out of ice boxes on repair jobs. Wooden platforms are placed for the girls to stand

on while packing goods in refrigerated rooms and, again, the wearing of proper shoes, stockings, and other clothing is emphasized. Five minute ventilation periods twice a day are instituted in offices that are not air conditioned, and glass window louvres are installed. Girls packing crackers from moving belts are relieved frequently enough to prevent eyestrain. Workers developing tenosynovitis from repeated motion on unaccustomed jobs are changed to other work until they can safely attempt their original job again. And employees developing apparent idiosyncracies or allergic reactions to such substances as flour, sugar, and dust necessarily are removed from the offending exposure.

In view of the above more common, but nevertheless real, hazards of working conditions we believe it is justifiable to emphasize this fact—that it is not necessary to practise medicine in a plant where there are obvious toxic hazards in order to be exposed to a consideration of industrial hygiene.

The course of the foregoing remarks might lead one to believe that in our opinion toxic hazards are not frequently present in small plants. It does so happen that with the exception of a lead foundry we have learned of no serious results from whatever toxic hazards may be present in the production departments of the following industries: bakery, calf skin tannery, cigarette factory, confectioners, lithographers, men's suit factory, paper bag and paper box factory, pork packers, silk mill, woolen mill, or steel mill. But to say that no toxic hazards are to be encountered in these industries would be far from the truth. In tabulating the number of different hazards attributed to them, the *Bulletin of the United States Bureau of Labor Statistics*, No. 582, entitled "Occupation Hazards and Diagnostic Signs" was used as a guide. As two examples of the tabulation, it was learned that in a calf skin tannery one would probably find 23 toxic hazards, 2 possibilities of infection, one specifically anthrax of course, 9 agents which might cause a dermatosis, and 2 hazards relative to working conditions. And in a lithograph plant there should be found 29 poison hazards, 6 agents irritating to the skin, and 3 hazards of working conditions.

If any good can come from it we are willing to admit that our own list of the probable toxic hazards in these plants was less than half as large. Two explanations are suggested for this shortcoming: first, we have seen in the industrial hygiene literature very few cases reported, if any, of several of the compounds being hazardous as used in a tannery or lithograph plant; and second, within the past 10 years we do not recall an employee visiting the dispensary with symptoms suspicious of an exposure to any but a few of them. However, there is still no excuse for not being aware of the presence of every toxic substance in whatever plant we serve, who uses it, how often, and under what conditions. Certain minor clinical pictures in the individual employees exposed might thereby take on a new meaning, and we would have the satisfaction of being a better industrial physician for having recognized it.

Apparently the better way to be sure about the toxic hazards in a plant these days when so many new compounds such as the volatile solvents are being introduced is to go over a list of all substances used in the processes of manufacture with the plant chemist or some individual equally well informed. By checking this list with reliable information on the subject the ones commonly known to be hazardous can then be studied under their specific conditions of use. And probably more can be learned about the toxicity of the newer compounds by observing them suspiciously from a clinical viewpoint than by depending upon the technical

knowledge of their toxicity based upon admittedly unsatisfactory laboratory procedures. At any rate the industrial physician or general practitioner in industry should include the study of these compounds as a part of his regular work and be mindful of them in making his routine sanitary surveys.

The sanitary survey in the plant should be the means of keeping abreast of the entire picture of industrial hygiene. It can be as comprehensive as the physician in charge cares to make it. But, routinely, at least once every 6 weeks, the physician purposefully should take the time to go through the entire plant and even poke into the corners. In no other way can he retain a perspective of what is going on. Even when the survey has become his established habit it would be well to carry with him a work sheet upon which at one side are mimeographed the entire array of items of industrial hygiene and sanitation which he might encounter. These can be referred to at a glance and notes made accordingly.

In the smaller plant the physician has the advantage of a closer personal contact with the employees than he has in a larger one. Much can be learned by asking the foreman directly what problems of physical working conditions are unsatisfactory in his department—facts which the physician himself might not recognize for some time. If an appraisal of these facts substantiates the foreman's ideas the matter may be justifiably incorporated in the written report to the management. Furthermore, in a smaller plant the dispensary comes to be regarded as the employee's clearing house for complaints about most everything pertaining to working conditions. Some of these have real merit as industrial hygiene problems and are often supplemented by suggestions for their correction. The feeling generally seems to be that one suggestion from the doctor to the management will be taken more seriously than a dozen suggestions to the foreman who may frequently regard them as personal complaints or be hesitant about carrying them to his superiors. This accumulated information, then, can be added to the physician's survey notes and condensed into a short, readable report which if possible includes recommendations for their correction. Nine out of ten managements will appreciate this procedure and take steps to carry out the suggestions noted. It has been our experience that even though many minor corrections in a smaller plant may be made by the frequent possible interviews with the executives, the report of a survey in writing puts the more serious and expensive matters on record and lends enough additional weight to its contents to make the effort worth while.

In summarizing the above consideration of industrial hygiene in smaller plants, the following thoughts have been presented: (1) that the problems of the smaller plant may very well be as seriously hazardous as in the larger ones and should be treated accordingly: (2) that the lesser hazards involving working conditions assume a major rôle in most of the smaller plants but enjoy inconspicuous recognition in the industrial hygiene picture; (3) that the less toxic hazards are present in most plants in larger numbers than the average physician in industry realizes; (4) that the most satisfactory way to learn of the presence of those hazards is to comb the plant processes with the help of the chemist and to study the less well known ones from a clinical viewpoint until satisfactory laboratory procedures catch up with the pace; and (5) that adopting the procedure of a rather frequent plant survey and its written report is worth the effort as a means of keeping the management alive to the idea of maintaining better health for its employees.

But what we believe is the most important thought of all in this subject is neither the problem of the hazards encountered or how to handle them, nor is it the problem of the major work of caring for accidents and general health. What we do believe is of most importance is the fact earlier alluded to that such a large majority of smaller plants have no medical supervision by which an industrial hygiene problem might even be recognized. Finding some way by which the general practitioner who will take an interest in industrial hygiene can link arms with the small plant executive interested in the better health of his employees is the first problem of extending industrial hygiene into the field of smaller plants. It is a problem about which we have spoken a few times before. To solve it depends upon disseminating the knowledge of the feasibility of a part-time medical service which thereby implies a certain amount of publicity which in turn involves the question of medical ethics.

Recent considerations of the Council on Industrial Health seem very definitely to be paving the way for organized medicine to take some hand in the matter. We believe we are approaching the time when a larger number of small plants will be served by a larger number of general practitioners sincerely interested in industrial medicine and better trained in industrial hygiene.

A Study of Deaths from Farm Accidents in Alabama*

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ALABAMA is predominantly a rural state, with approximately a 37 per cent Negro population. In 1930, 72 per cent of its population was classified as rural; 50 per cent, rural farm. The following study is based upon data secured through accident questionnaires† collected over 7 years (1932–1938) by the Bureau of Vital Statistics. Every certificate of death filed in the Bureau of Vital Statistics of the State Board of Health on which the medical certification gave an accidental cause of death was queried. The query was mailed to the family in which the accident occurred, a guarantee postage envelope being enclosed to make its return more certain. County health officers also have assisted materially in securing their completion.

For the purposes of this study, farm accident deaths have been divided into two groups: occupational and non-occupational. The former includes only deaths of persons gainfully employed in farming pursuits at the time of the accident; the latter, deaths of persons residing on farms, but not so employed when the accident occurred. Future references to these groups will be found under the terms " farm industrial " and " farm home."

The subject of farm accident fatalities has appeared only infrequently in the literature.[1, 2] Heretofore, emphasis has been placed largely upon the agency of injury. Broad descriptive terminology has blurred a detailed and specific picture of what happened and how it happened. The use of vague and nondescript terms such as " falls," " falling objects," etc., has given but part of the story. What is needed is more precise knowledge of how the accident actually occurred. Did someone slip on a particular object and how did that object get where it was? From a public health standpoint, a sufficiently complete picture of the accident must be had, in order to formulate sound guidance for its prevention. This is reflected in the recently developed " Heinrich Cause Code "[3] for the analysis of accidents. This code calls for the name of the agency of injury; name of agency's part; statement of unsafe condition, mechanical or physical; type of accident; statement of both the unsafe act resulting in the accident and the personal factor leading to the act. Were one to apply this Code to an accident, the data might be recorded somewhat as follows:

Agency: Saw
Agency's part: None
Unsafe mechanical or physical condition: Unguarded blade
Accident type: Pressed body against saw
Unsafe act: Using unguarded saw
Unsafe personal factor: Poor eyesight

* Chairman's address delivered before the Health Officers Section of the American Public Health Association at the Sixty-eighth Annual Meeting in Pittsburgh, Pa., October 19, 1939.

† Copies of the questionnaire are obtainable from the Alabama State Department of Health, Montgomery, Ala.

TABLE 1

Deaths from Farm Home and Farm Industrial Accidents According to Year, 1932–1938

	Home			Industrial		
Year	Total	Farm	Per cent Farm	Total	Farm	Per cent Farm
1932	...	...	....	168	44	26.2
1933	474	225	47.5	182	53	29.1
1934	595	292	49.1	209	47	22.5
1935	613	276	45.0	192	40	20.8
1936	645	284	44.0	236	47	19.9
1937	669	268	40.1	302	45	14.9
1938	652	249	38.2	196	33	16.8

Powers [4] made a contribution to the farm accident picture when he included the motivating activity as well as the agency of injury. However, he did not correlate the activity with the agency of injury.

In this study, effort has been made to apply such correlation. To add further to the accident picture, the 6 leading motivating activities have been listed in order of descending importance. Opposite each activity is shown the agency of injury, also in descending order of importance.

FARM INDUSTRIAL ACCIDENTS

General — Three hundred and nine deaths from farm industrial accidents (Table 1) were recorded over the 7 year period (1932–1938), an average of 44 per year. Of this number, 186 (60.2 per cent) were white; 123 (39.8 per cent) colored. Only 18 females were included; 8 white—10 colored.

An annual average of approximately 16 of each 100 deaths from farm accidents were classified as industrial.

The mean white death rate for the above period was 9.8 per 100,000—colored, 7.9. The corresponding rates for the white males and colored males were equal at 10.7.

Season — Forty-six per cent of the deaths occurred during the 4 summer months (Table 2 and Figure 1) (June–September), compared with half that figure over an equal period in the winter (October–January).

TABLE 2

Deaths from Farm and Farm Home Accidents According to Month of Occurrence of the Accident

	Farm Home						Farm Industrial					
	Total		White		Colored		Total		White		Colored	
Month	No.	Per cent	No.	Per cent	No.	Per cent	No.	Per cent	No.	Per cent	No.	Per cent
January	178	11.4	103	11.0	75	12.1	20	6.5	15	8.1	5	4.1
February	154	9.9	86	9.1	68	11.0	27	8.7	18	9.7	9	7.3
March	157	10.1	100	10.6	57	9.2	19	6.2	11	5.9	8	6.5
April	138	8.8	75	8.0	63	10.2	19	6.2	11	5.9	8	6.5
May	95	6.1	65	6.9	30	4.8	29	9.4	19	10.2	10	8.1
June	72	4.6	51	5.4	21	3.4	47	15.2	25	13.4	22	17.9
July	96	6.2	61	6.5	35	5.6	31	10.0	16	8.6	15	12.2
August	125	8.0	86	9.1	39	6.3	29	9.4	17	9.1	12	9.8
September	105	6.7	66	7.0	39	6.3	36	11.6	21	11.3	15	12.2
October	116	7.4	66	7.0	50	8.1	17	5.5	10	5.4	7	5.7
November	144	9.2	84	8.9	60	9.7	21	6.8	13	7.0	8	6.5
December	180	11.5	98	10.4	82	13.2	14	4.5	10	5.4	4	3.2
Unknown	34		19		15							
Total	1,594	100.0	960	100.0	634	100.0	309	100.0	186	100.0	123	100.0

FIGURE 1—PER CENT DISTRIBUTION OF DEATHS FROM FARM HOME AND FARM INDUSTRIAL ACCIDENTS ACCORDING TO MONTH OF THE OCCURRENCE OF THE ACCIDENT

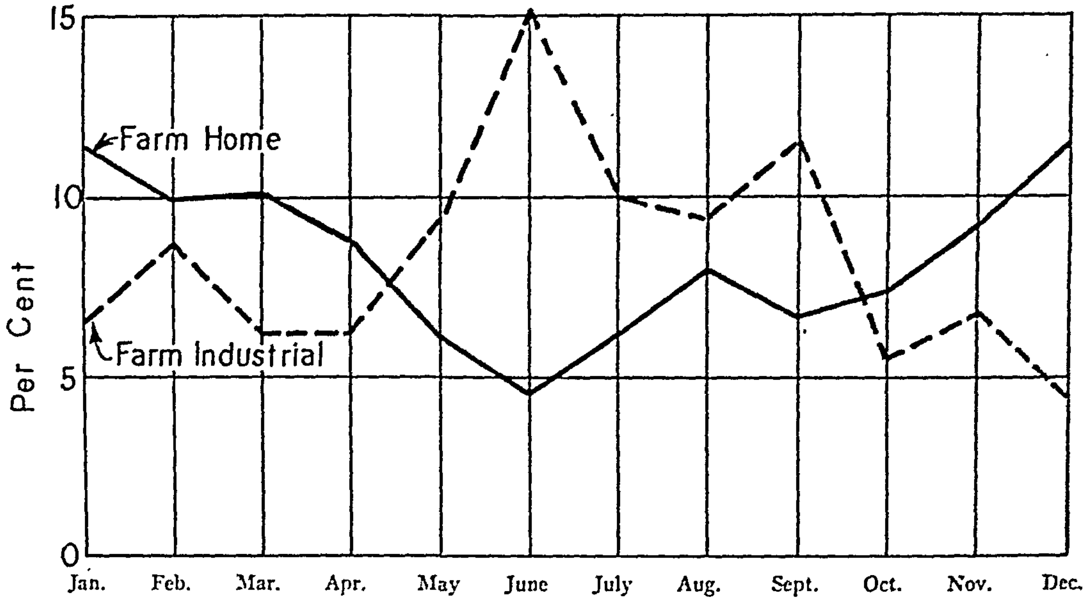

TABLE 3
Age Specific Death Rates per 100,000 Population from Farm Industrial Accidents, Males, 1932–1938

Age	*Male Population Engaged in Farming, 1930*	*Total Male Deaths*	*Mean Death Rate*
10–19	89,050	47	7.5
20–24	51,407	29	8.1
25–34	65,427	37	8.1
35–44	54,805	29	7.6
45–54	66,027	51	11.0
55–64	37,904	40	15.1
65–74	18,397	34	26.4
75 and Over	5,114	24	67.0
Unknown	185		
Total	388,316	291	10.7

Age—Ages of the decedents extend from childhood to old age (Table 3). Rates for males only are shown, because of the small number (18) of female deaths. The rates for males remained fairly constant up to 45 years, after which marked increases may be noted. Although the likelihood of males dying from farming pursuits at 55–64 years was double that at 10–19 years, it was less than one-fourth that at 75 years and over.

FIGURE 2—CUMULATIVE PER CENT OF DEATHS FROM FARM INDUSTRIAL AND FARM HOME ACCIDENTS ACCORDING TO INTERVAL BETWEEN DATE OF ACCIDENT AND DATE OF DEATH

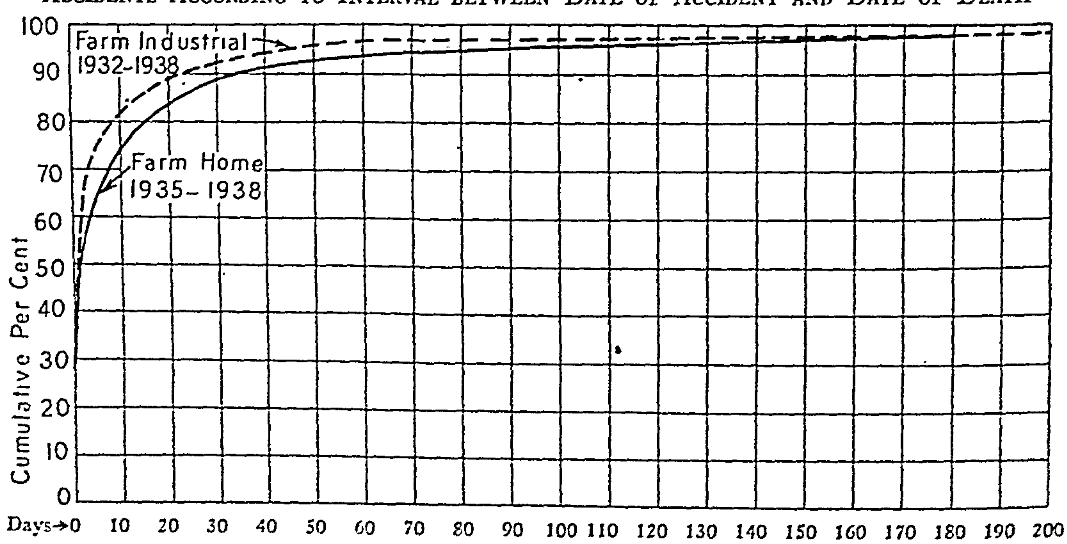

TABLE 4

Deaths from Farm Home and Farm Industrial Accidents According to Interval Between Date of Accident and Date of Death

	Farm Home			Farm Industrial		
Days	*Number*	*Per cent*	*Cumulative Per cent*	*Number*	*Per cent*	*Cumulative Per cent*
Instantly	281	26.4	26.4	95	31.8	31.8
Under 1 day	173	16.3	42.7	65	21.7	53.5
1 day	109	10.3	53.0	28	9.4	62.9
2 days	57	5.4	58.4	19	6.4	69.3
3 days	43	4.0	62.4	8	2.7	72.0
4 days	24	2.3	64.7	7	2.3	74.3
5 days	25	2.4	67.1	5	1.7	76.0
6 days	20	1.9	69.0	5	1.7	77.7
7 days	27	2.5	71.5	5	1.7	79.4
8 days	16	1.5	73.0	4	1.3	80.7
9 days	20	1.9	74.9	6	2.0	82.7
10– 19 days	94	8.8	83.7	15	5.1	87.8
20– 29 days	54	5.1	88.8	13	4.3	92.1
30– 39 days	27	2.5	91.3	6	2.1	94.2
40– 49 days	15	1.4	92.7	4	1.3	95.5
50– 59 days	12	1.1	93.8	4	1.3	96.8
60– 69 days	6	0.6	94.4	0	0.0	96.8
70– 79 days	7	0.6	95.0	0	0.0	96.8
80– 89 days	5	0.5	95.5	0	0.0	96.8
90– 99 days	5	0.5	96.0	1	0.3	97.1
100–199 days	28	2.6	98.6	4	1.3	98.4
200–299 days	8	0.7	99.3	4	1.3	99.7
300–399 days	4	0.4	99.7	0	0.0	99.7
400–499 days	2	0.2	99.9	0	0.0	99.7
500 days and over	1	0.1	100.0	1	0.3	100.0
Unknown	14			10		
Total	1,077	100.0		309	100.0	

Interval—Death follows a large per cent of farm industrial accidents quickly (Table 4 and Figure 2). About one-third of the deaths occurred instantly; one-half within 24 hours, and 78 per cent within one week. The interval between time of accident and death ranged from instant death to a maximum of 932 days.

Correlation—Applying the correlation technic previously referred to (Tables 5 and 6) it will be seen that of all

TABLE 5

Deaths from Farm Industrial Accidents According to Activity and Agency of Injury, 1932–1938

		Agency of Injury													
Activity	*Total*	*Animals*	*Falling Objects*	*Lightning*	*Sunstroke*	*Vehicles*	*Burns*	*Falls*	*Machinery*	*Poisons*	*Striking Objects*	*Hand Tools*	*Handling Objects*	*Other*	*Unknown*
Total	309	58	53	47	29	26	19	16	16	9	8	8	6	7	7
Cutting & Sawing Lumber	52	..	39	..	..	..	..	1	3	1	1	6	..	1	..
Caring for Animals	37	25	..	4	..	..	2	3	..	..	..	..	..	3	..
Plowing	31	6	..	10	8	3	..	1	..	..	1	..	2	..	..
Driving Vehicles	22	..	2	..	..	16	..	..	..	1	2	..	..	1	..
Clearing Land	17	..	3	..	..	..	13	..	..	..	..	..	1	..	..
Riding Animals	17	14	..	3	..	..	..	..	..	..	..	..	..	..	..
Building & Repairing Fences, etc.	12	..	2	..	..	..	1	6	..	1	..	..	2	..	..
Hoeing	10	..	..	6	3	..	..	..	..	1	..	..	..	..	..
Operating Machinery	10	..	..	..	..	2	..	..	8	..	..	..	..	..	..
Loading-Unloading Vehicles	10	..	2	2	1	4	..	..	..	1	..	..	..	..	..
Repairing Tools, etc.	6	1	..	..	..	..	1	..	3	..	..	1	..	..	..
Picking Cotton	5	..	..	1	2	..	..	..	..	2	..	..	..	..	..
Shucking Corn and Peanuts	3	..	..	3	..	..	..	..	..	..	..	..	..	..	..
Other	22	1	1	6	4	1	1	1	2	1	1	..	1	2	..
Unknown	55	11	4	12	11	..	1	4	..	1	3	1	..	..	7

TABLE 6

Per cent of Deaths from Farm Industrial Accidents According to Activity and Agency of Injury, 1932–1938

Motivating Activity	Agency of Injury I	II	III	IV	V	VI
Cutting & Sawing Lumber 20.5	Falling Objects 75.0	Hand Tools 11.5	Machinery 5.8	Falls 1.9	Striking Objects 1.9	Poisons 1.9
Caring for Animals 14.6	Animals 66.7	Lightning 11.1	Falls 8.3	Burns 5.6		
Plowing 12.2	Lightning 32.2	Sunstroke 25.8	Animals 19.4	Vehicles 9.7	Handling Objects 6.4	Falls 3.2
Driving Vehicles 8.7	Vehicles 72.7	Falling Objects 9.1	Striking Objects 9.1	Poisons 4.6		
Clearing Land 6.7	Burns 76.5	Falling Objects 17.7	Handling Objects 5.9			
Riding Animals 6.7	Animals 82.4	Lightning 17.7				

known activities, cutting and sawing lumber was recorded once for every 5 farm industrial deaths. In 3 out of 4 deaths from this activity, a falling object was the destroying agent. Seventy-nine per cent of these objects were falling trees. Of the 8 remaining deaths, 6 were from falling limbs and 2 from being struck by a stick of wood.

Caring for animals—The activity second in importance, the caring for animals, resulted in 37 deaths, or 14.6 per cent of all the deaths from farm industrial accidents. Fourteen of these deaths involved mules and in 10 instances the animal kicked its victim to death. Other animals included 5 cows, 3 horses, 2 hogs, and 1 bull. Both of the accidents with hogs were caused by the decedent falling over the animal. One-half of those caring for animals were aged 60 years or over. This fact in itself would seem to indicate that unsafe acts may have been responsible for many such deaths.

Plowing—The activity third in importance, plowing (12.2 per cent), was associated with 31 deaths, 10 of which were from being struck by lightning. Eight were attributed to sunstroke and 6 involved animals. Of the latter, 3 were by kicking, 1 gored, 1 stepped upon, and 1 dragged. Two tractors overturned and the driver of the third fell under the plow. Two individuals were struck by the plow handles and one fell into an old well not known to exist.

Driving vehicles—The activity fourth in order of importance, driving vehicles (8.7 per cent), ended in death for 22 persons, three-fourths of whom fell—14 from wagons and 2 from trucks. Two were struck by falling objects—a falling tree and a shed. Two struck objects. One of the latter occurred by

hitting the head against a trestle as a wagon was driven under it; the other by striking the head against a log. One death occurred from snake bite. The driver had captured a rattlesnake and had tied it to a stick for transportation to his home. The snake got loose and he was bitten.

Clearing of land—The activity fifth in importance, clearing of land (6.7 per cent), resulted in 17 deaths, more than three-fourths of which were caused by burns. The burning of brush claimed 9 lives, and of stalks, 2. One individual fell into a pile of burning logs. One death resulted from burns received when a burning tree fell on its victim. In this activity group, falling objects claimed 3 lives and of these a falling limb and pole accounted for one each, while a dirt cave-in was responsible for the third. Pushing against a tree resulted in 1 death.

Riding animals—Of equal importance to the activity of clearnig land was that of riding animals, which also resulted in 17 deaths. Three of the decedents were struck by lightning. Of the remaining 14, 11 were caused by the rider becoming entangled in the harness and being dragged by mules. Interestingly enough, about one-half of the deaths from riding animals were of young people (10–14 years). Practically all of the decedents were under 25 years.

FARM HOME ACCIDENTS

Let us now turn from deaths from "farm industrial" accidents and consider those resulting from "farm home" accidents. The period here covered is one year shorter than that for the industrial study, being 6 years (1933–1938). The reason for the exclusion of 1932 is that in this year a severe storm of cyclonic proportions swept the state, causing an unusually high number of home deaths. To have included these would have given an inaccurate and distorted picture.

General — There were 1,594 lives sacrificed (Table 1) by accidents in farm homes, an annual average of 266 deaths. White deaths totalled 960 (60.2 per cent)—colored, 634 (39.8 per cent). Of the white figure, 512 (53.3 per cent) were females—448 (46.7 per cent), males. Again, of the colored figure, 325 (51.3 per cent) were females—309 (48.7 per cent), males.

The mean colored death rate (21.3 per 100,000) exceeded the white (19.0). The excess of the white female rate (20.9) over that of white males (17.3) was much greater than that of colored females (21.5) over colored males (21.0).

TABLE 7

Total Deaths from Farm Home Accidents and Mean Death Rates per 100,000 Population According to Age, Sex and Color, 1933–1938

	Total Deaths				*Mean Death Rates*			
	White		*Colored*		*White*		*Colored*	
Age	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*
Total	448	512	309	325	17.3	20.9	21.0	21.5
0– 4	155	121	110	120	46.1	37.0	58.1	62.6
5– 9	40	49	40	39	11.2	14.2	18.6	18.6
10–14	26	23	29	16	7.5	7.1	13.8	7.9
15–19	19	9	15	22	5.9	3.1	7.9	11.5
20–24	19	11	17	8	8.4	5.2	14.2	5.7
25–29	14	4	9	9	9.1	2.5	11.4	9.2
30–34	10	13	10	7	7.9	9.6	18.8	9.6
35–44	17	12	6	13	7.1	4.7	6.0	8.0
45–54	16	8	18	13	6.8	4.0	10.1	10.0
55–64	14	27	14	20	10.1	24.2	15.9	32.0
65–74	37	53	15	26	47.3	85.4	35.9	78.9
75 & Over	80	182	25	32	255.0	613.0	142.6	166.2
Unknown	1		1					

TABLE 8

Deaths from Farm Home Accidents According to Activity and Agency of Injury, 1933–1938

Motivating Activity	*Total*	*Agency of Injury*: *Burns*	*Falls*	*Firearms*	*Suffocations*	*Poisons*	*Lightning*	*Drowning*	*Cuts and Scratches*	*Animals*	*Other*	*Unknown*
Total	1,594	527	419	148	138	122	55	35	19	13	104	14
Playing	229	115	38	21	5	4	4	13	3	8	18	..
Walking	185	5	161	9	..	..	4	1	1	1	3	..
Sleeping	159	48	1	3	89	2	..	..	..	..	16	..
Standing	134	72	26	10	..	..	15	3	3	2	3	..
Eating and Drinking	120	1	..	..	24	95	..	..	..	..	..	..
Sitting	76	35	19	9	..	..	10	..	..	..	3	..
Handling a Gun	51	..	..	51	..	..	..	..	..	..	..	..
Lying Down	37	12	14	1	5	1	1	..	..	..	3	..
Making a Fire	36	34	..	..	..	..	..	..	1	..	1	..
Cooking	15	10	5	..	..	..	..	..	..	..	..	..
Laundering	9	4	..	..	..	..	3	1	..	..	1	..
Other Housework	35	5	12	6	..	..	5	4	3	..	..	..
Getting in or Out of Bed	18	..	18	..	..	..	..	..	..	..	..	..
Taking Medicine	12	..	..	..	..	12	..	..	..	..	..	..
Climbing	11	..	7	4	..	..	..	..	..	..	..	..
Crawling	10	8	1	..	1	..	..	..	..	..	..	..
Dressing and Undressing	8	2	5	..	..	..	1	..	..	..	..	..
Carrying Inflammables	8	8	..	..	..	..	..	..	..	..	..	..
Carrying Other Objects	8	1	5	1	..	..	..	..	..	..	1	..
Bathing	5	1	2	..	..	..	1	1	..	..	..	..
Swimming	3	..	..	..	..	..	..	3	..	..	..	..
Smoking	3	3	..	..	..	..	..	..	..	..	..	..
Other	9	2	1	..	..	1	..	..	..	..	5	..
Unknown	413	161	104	33	14	7	11	9	8	2	50	14

Season—Only one-quarter of the fatal home accidents (Figure 1) occurred during the 4 summer months (June–September) compared with 46 per cent for the industrial group. Similarly, 40 per cent of the home accidents occurred during 4 winter months (October–January) compared with 23 per cent for the industrial.

Age—The death rates (Table 7) for both sexes were similar in each age group up to 50 years, after which the female rate became increasingly greater than the male rate with advance in age. Between 15 and 50 years, the rates remained practically constant. Colored rates exceeded the white in each age group up to 65–74 years, after which the opposite was true. The rates were similar for both sexes and colors up to 45–54 years, after which the white female rate rose to the highest point; white males, second highest; colored females, third; and colored males, fourth.

Interval—Cumulative per cents of deaths (Table 4 and Figure 2) according to interval from occurrence of accident to death, show, just as in the case of farm industrial accidents, that a large number of the decedents die shortly after the accident occurs. The rise in per cent is not quite so rapid as in the case of deaths from farm industrial accidents.

The motivating activity, as in the case of farm industrial accidents, has been correlated with the agency of injury (Table 8), as has also been the activity in order of descending importance with the agency of injury (Table 9).

Playing—Playing comprised 1 out of 5 of all activities ending in death, and burns constituted the destructive agency in more than half of the deaths (115) which occurred while playing. Forty of

TABLE 9

Per cent of Deaths from Farm Home Accidents According to Activity and Agency of Injury, 1933–1938

Motivating Activity	Agency of Injury					
	I	II	III	IV	V	VI
Playing 19.4	Burns and Burning Buildings 50.3	Falls 16.6	Firearms 9.2	Drowning 5.7	Animals 3.5	
Walking 15.7	Falls 87.0	Firearms 4.9	Burns and Burning Buildings 2.7	Struck by Lightning 2.2	Cuts and Scratches 0.5	Animals 0.5
Sleeping 13.5	Suffocation 56.0	Burns and Burning Buildings 30.2	Firearms 1.9	Poisons 1.3	Falls 0.6	
Standing 11.3	Burns and Burning Buildings 53.7	Falls 19.4	Struck by Lightning 11.2	Firearms 7.5	Cuts and Scratches 2.2	Drowning 2.2
Eating & Drinking 10.2	Poisons 79.2	Suffocation 20.0	Burns and Burning Buildings 0.8			
Sitting 6.4	Burns and Burning Buildings 46.0	Falls 25.0	Struck by Lightning 13.2	Firearms 11.8		

the 115 individuals injured in accidents classified under this rubric received burns from fires in open fireplaces of sufficient severity to cause death. Some fell into the fire and others were so close to it that their clothing became ignited. Thirty-one deaths in this group of burns (27.0 per cent) were caused by turning over vessels containing hot liquids. Practically all of the victims were less than 5 years.

In 10 instances matches set fire to clothing or other material. Clothes were ignited from yard and field fires in 14 instances. Falls, the second most important agency of injury in the playing group, resulted in a wide variety of accidents. More than half of the falls were from a higher to a lower level such as from porches or swings down to the ground. Of 21 gunshot deaths, 15 (71.4) were the result of someone playing other than the decedent, in 6, the decedent himself. Uncovered wells accounted for 6 deaths by drowning, while an equal number of individuals were kicked to death by animals. There were 5 suffocations, one of which was caused by a foreign body; one child was caught in the ropes of a swing, one fell between two planks, and one into a pile of cotton. There was one where the cause

of the suffocation was unknown. Of the 4 poisonings, 3 were caused by snake bite and one by a spider bite.

Playing as an activity was of approximately equal frequency per 100 accidents for both white and colored, although the per cent for males was higher than for females. However, the death rate per 100,000 population of those 5–14 years, in which age group practically all such deaths occurred, was for the white, 4.3—colored, 6.9. About 11 per cent of the white deaths in this group had their origin in burns received from fires in open fireplaces and of the colored, 29.8 per cent. For burns from hot liquids the percentages white and colored were 15.5 and 6.0, respectively.

Walking—There were 185 deaths from accidents which occurred while walking, making this activity the second most important (15.7 per cent). Falls were the most frequent agency of injury recorded (51.1 per cent) for this group. Falls from steps and falls on the floor were of about the same importance and accounted for 42 per cent in this group classified as walking. Porches were credited with 12 such deaths. Of the 9 deaths from firearms, 6 resulted from self-inflicted wounds. The act of walking is much more frequently associated with fatal injuries among white than colored, the motivating activity per cent distribution being 20.9 and 7.4, respectively. Comparison of the colored per cents shows them to be practically equal for both sexes, whereas the per cent for white females (25.3) is well above that of white males (16.3).

Sleeping—Sleeping, the third most important (13.5 per cent) activity, was associated with 159 accidental deaths. Over half (56.0 per cent) of them were from suffocation. Twenty-three infants were overlain. The agency of injury second in importance in this group was that of burns. Forty (83.3 per cent) such deaths were from burns received in burning buildings. While 35 per cent of the colored sleeping deaths were from burns, 25.6 per cent were recorded for the white. About 55 per cent of both colors in this activity group were suffocated. Proportionately more sleeping deaths occurred among colored (17.7) than white (10.8) and among males than females for both colors.

Standing—Standing, the activity fourth in importance (11.3 per cent), was associated with the death of 134 individuals, of which number 72 succumbed to burns. An open fire was the origin in 59 (81.8 per cent) instances. Falls, the second agency of injury in importance, accounted for 26 deaths (19.4 per cent). Falls from porches numbered 7. Others included falls on the floor, down steps, out the door, etc. Two persons were knocked down when a door was opened. Fifteen in the "standing group" were struck by lightning. Ten were shot, half the shots being self-inflicted, and 3 were drowned in wells.

Of the colored standing deaths, 52.6 per cent were caused by burns from open fires compared with 36.4 per cent for the white; 30.3 per cent of the white deaths in this group resulted from falls —colored, 5.3.

Eating and drinking—Eating and drinking, the activity fifth in importance (10.2 per cent), terminated fatally for 120 persons, of which number 95 were attributed to poisoning. Food poisonings totalled 45.

Of the 50 remaining deaths, 23 were from lye poisoning. Rat poison was charged with 4 deaths; kerosene, 3. Other poisons included bichloride, strychnine, calcium arsenate, gun powder, cotton and potato spray. Twenty-four of the eating deaths were from suffocation, 14 of which (58.3 per cent) were caused by foreign bodies.

Sitting—Sitting, the activity sixth in importance (6.4 per cent), was involved in 76 deaths, 35 (46 per cent) of which were from burns. Of the latter figure,

30 (85.7 per cent) were caused by open fires. Of the white deaths in this activity group, 32.6 per cent were caused by burns—colored, 63.6. Falls, the second leading agency of injury in the group, caused 19 (25.0 per cent) deaths. Five of the falls were from porches; 3, chairs; 2, swings, and 2 were on floors.

Taking medicine—Although the activity of taking medicine resulted in only 12 deaths, it is important to note the agency of injury. Nine of the decedents were white. A well known patent medicine for the relief of headaches taken in an overdose took one life. Still another patent medicine for the treatment of worms caused one death. In 2 instances oil of chenopodium was concerned. A combination of this oil and alcohol resulted in one of these deaths.

Living alone—While studying the data secured for this study, it was noted that a considerable number of fatalities occurred in homes where the decedent lived alone or was left alone at the time of the accident. Over the 6 year period 1933–1938, 44 such deaths were recorded. Of that number, 16 of the decedents were white—28, colored. In this connection, it should be remembered that whereas 37 per cent of the rural farm population was colored, 63.7 per cent of these deaths were of colored persons. Sixteen of the 44 were infants of 1 year or less. Thirty-two (72.7 per cent) were from burns, one-half of which were received in burning homes; the remaining half was almost evenly divided between falling into open fires and the clothing being ignited. Five infants crawled into open fires. Decedents from open grate burns covered the entire age range, unlike burns from other sources which were confined mostly to the early age groups.

CONSIDERATION OF AGENCY OF INJURY ALONE AMONG FARM HOME ACCIDENTS

Up to this point, discussion of the agency of injury has been confined to its linkage with the motivating activity. The discussion which follows will concern itself with the agency of injury without regard to the motivating activity.

Burns, including those from burning buildings, was the outstanding (Table 10) agency of injury, accounting for 33.4 per cent of all deaths, closely followed by falls (26.5 per cent). Firearms was third (9.4 per cent); suf-

TABLE 10

Number and Per Cent of Deaths from Farm Home Accidents According to Agency of Injury by Sex and Color, 1933–1938*

	Number							Per cent						
		White			Colored				White			Colored		
Agency of Injury	*Grand Total*	*Total*	*Male*	*Female*	*Total*	*Male*	*Female*	*Grand Total*	*Total*	*Male*	*Female*	*Total*	*Male*	*Female*
Total	1,594	960	448	512	634	309	325	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Burns	536	252	115	137	284	117	167	33.7	26.4	25.6	26.9	45.1	38.1	51.9
Falls	409	350	115	235	59	29	30	25.8	36.5	25.7	46.1	9.4	9.4	9.3
Firearms	154	76	54	22	78	48	30	9.7	7.9	12.1	4.3	12.4	15.6	9.3
Suffocations	138	73	49	24	65	31	34	8.7	7.6	10.9	4.7	10.3	10.1	10.6
Poisons	122	73	40	33	49	25	24	7.7	7.6	8.9	6.5	7.8	8.1	7.5
Drownings	41	20	10	10	21	10	11	2.6	2.1	2.2	2.0	3.3	3.3	3.4
Cuts and Scratches	18	10	5	5	8	2	6	1.1	1.0	1.1	1.0	1.3	0.7	1.8
Animals	10	7	7	..	3	3	..	0.7	0.7	1.6	...	0.5	1.0	...
Other	159	97	53	44	62	42	20	10.0	10.2	11.9	8.5	9.9	13.7	6.2
Unknown	7	2	..	2	5	2	3							

* Totals do not agree with those in Table 8 because the figures in this table were secured by machine count from punch cards, whereas, those in Table 8 were secured by hand tabulation. The differences, for the most part, are due to changes made in the classification of the agency of injury.

focation, fourth (8.7 per cent) and poisoning, fifth (7.7 per cent).

Color and sex—The per cent distributions by color were quite different. Among the white, burns accounted for 26.4 per cent—colored, 45.1. The per cent of deaths from falls among the white (36.5 per cent) was about 4 times the colored figure (9.4). Slightly more deaths occurred proportionately from suffocation and from firearms among the colored than the white. Among the white the per cent for both sexes from burns was about the same (26.0); the colored female figure (51.9) was well above that of colored males (38.1). On the other hand, the per cents for both sexes among the colored from falls were about the same (9.4), whereas the white female per cent (46.1) was considerably higher than that for the males (25.7).

Snakes—insects — Eight deaths resulted from snake bites. Of the 8 deaths from insects, 6 were caused by spider bites, 1 bee sting, and 1 unspecified. Among the industrial deaths previously discussed there were 9 deaths from snake bites making a grand total of 17 such deaths on Alabama farms.

Suffocation—Suffocation as an agency of injury destroyed 138 lives, all but 27 of whom (80.4 per cent) were under 1 year; 47 per cent of suffocations at all ages were colored. Forty-four infants (31.9 per cent) were overlain; 39 persons (28.3 per cent) were strangled by foreign bodies or food. More than half of the latter (22) were by foreign bodies; 38 (27.5 per cent) by bed clothes. Difference between white and colored per cents may be noted. Whereas 28.8 per cent of white suffocations were from being overlain, the per cent colored was 35.4. Proportionately 4 times as many white deaths involved foreign bodies (not food) as colored; almost 3 times as many colored deaths by food strangulation as white. Foreign bodies included such objects as follows: peanut, peanut hull, grain of corn, bone, bean, plum and watermelon seed, chewing gum, sweet potato, and a token.

Falls—Falls upon floors were practically equal to the number on porches and steps combined; two-thirds of all deaths from this agency occurred from falls in one of these three places. One in 10 fatalities resulted from falls from furniture. The per cent of falls on floors by Negroes (14.8) was considerably less than that for whites (35.4); the opposite was true of falls on porches and steps, although not to the same extent. Most of the victims from falls were over 65 years of age.

Burns—Over one-half (55.6 per cent) of all deaths from burns, not including those from burning buildings, were caused by open fires; the per cents white and colored were 43.2 and 67.6, respectively.

Firearms—Firearms were responsible for the sacrifice of 154 lives; 59 of which (45 per cent) were from playing with guns. In 47 such instances (79.7 per cent), the victim was not the person holding the gun. Most of those killed as a result of playing with guns were under 20 years of age.

Epilepsy on the farm—Epilepsy is also a factor which must be considered. Forty-one epileptics ended their lives accidentally. Twenty-nine (70.7 per cent) of the decedents were colored—21 (51.2 per cent) were females. The total age distribution was scattered from childhood (0–4 years), to old age (85–89 years). Twenty-six deaths (63.4 per cent) were from falling into open fires. Five deaths were caused by falls miscellaneous in character; 4 falls into wells or springs, and 2 from burns other than by falling into the fire.

LOCATION OF FARM ACCIDENTS

The per cent distribution of accidents according to location of place of occurrence around the farm home was quite

different from that of farm industrial deaths. The home was the site most frequently recorded (79.0 per cent). Second in importance was the yard (15.9 per cent), and third, the field (2.7 per cent). A combination of farm industrial and farm home deaths places the home first in importance (68.4); second, the yard (15.2 per cent); third, field and pasture (9.2 per cent); fourth, woods (2.8 per cent); and fifth, the barn (1.4 per cent).

HISTORICAL RECORD

During the 6 year period, 1933–1938, an average of 84 out of each 100 accident fatalities on farms were caused by farm home accidents and 16, farm industrial. Both types comprised a smaller proportion of all home and industrial deaths from accidents in 1938 than in 1933. The maximum number of farm home deaths (292) occurred in 1934, the least (225) in 1933 during the above 6 year period. Over the same period, farm industrial deaths reached their highest point (53) in 1933—their lowest (33) in 1938.

IMPORTANCE OF THE FARM ACCIDENT PROBLEM

During the 6 year period, 1933–1938, 44 of each 100 deaths from all home accidents, and 1 in 5 of all deaths from accidents in industry were caused by accidents which occurred on farms. Approximately 310 deaths can be attributed to farm accidents annually, a much greater number than to any of the acute contagions taken singly. Just as in the case of the communicable diseases, accidents are in no small measure preventable, and should be considered and treated as such in all public health programs. Accidents do not "just happen"; they are the result of a specific cause or group of causes. Our ability to determine those causes will mean the success or failure of any health program in this regard.

COLLECTION OF INFORMATION ON CAUSES OF DEATH FROM FARM ACCIDENTS

To date, all too little information of value exists regarding the detailed causes of death from farm accidents. In Alabama, 10 years of persistent and conscientious effort to collect such data has yielded much valuable information. However, in so far as farm accidents are concerned, we do not yet have the detailed information necessary for their prevention. After a careful study of the completion of several thousand questionnaires, the conclusion has been reached that a simpler form might bring better results than the conventional but elaborate one now in use. In most instances, classification of the accident had to be made from items of general information and the description of the accident.

It is highly essential that the questionnaire be completed by some competent individual as quickly as possible after the death occurs. With this thought in mind, the full-time county health officers, now existing in every county of our state, were supplied with questionnaire forms. They were requested to secure their completion, if possible, before the regular time for forwarding the certificates to the Bureau of Vital Statistics, and to enclose them with the certificates. The success of such a plan depends largely upon the coöperation which can be had from the health officers. Because of lack of full coöperation in several instances and the need to secure the information promptly, it became necessary to send questionnaires directly from the Bureau of Vital Statistics to the families concerned, when the forms failed to accompany the certificates in the monthly report received from the health officer. Such practice, it was found, frequently resulted in a more prompt and better completion of the forms.

In theory at least, it might be still better if a local registrar of vital sta-

tistics secured the completion of the form at the time the certificate of death was filed with him. However, such a plan in order to be successful would have to provide remuneration to the registrar.

Once the true causes of farm accidents are determined, then the county health officer and his personnel should, through education and widespread promulgation of rules for their prevention, be just as successful in their reduction as safety engineers have been in the reduction of accidents in industrial plants.

Information should be made available to all schools and to the farm group through 4-H clubs, county home demonstration and farm agents, by the newspaper, radio, and all other accepted means of public health education.

CONCLUSIONS

1. Accidents are an important cause of death on the farm and in the farm home.

2. A revision of our present accident questionnaire form seems definitely indicated.

3. More detailed information on the causes of accidents must be obtained.

4. Farm accidents, like all other accidents, should be viewed as preventable causes of death and every effort made to reduce them to a minimum.

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School Health Education*

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IT is a privilege and a responsibility to present a summary and interpretation of the discussions of the School Health Section of a unique and unusually interesting Health Education Symposium. The credit for the scope, character, and content of these discussions is due to the careful planning and wise guidance of the discussion leaders, as well as, to the numerous participants who shared their experiences in moving a little closer to a more effective school health education program.

CONCEPT AND DEVELOPMENT OF SCHOOL HEALTH EDUCATION

If we are to attain the objectives of health education, we must see it as a continuous, integrated program at all age levels and view school health education as one important part of the larger problem of health education. Consideration is given here to those aspects of health education which occur in the schools under direction of the school authorities.

Our health education activities in the schools have developed from a number of different sources. The physician was called in to help control communicable diseases and remained to institute health examinations and lay the foundations for health service. The isolated teacher who included health instruction as a part of her program was compelled by pressure groups to teach hygiene and physiology for specific purposes. This developed into an acceptance of health as an educational objective and health instruction as one of its instruments. Then came the physical educator who thought in the early days he could exercise children into health—but the old activity program is moving toward a modern concept of physical education as contributor to a well rounded education for the whole child. And now we see guidance services of the school developing as a result of the problem child and the implications of the whole testing program. Unfortunately, these very important health activities have developed in most cases, as practically independent units of services. This lack of coordination has led to lowered levels of effectiveness and frequently to actual conflict. The result of this situation has led to many important and puzzling problems. It was the isolation of these problems, their analysis and discussion, that determined the objectives of this section of the Symposium. They may be stated as:

1. To bring to focus the problems and needs of the groups concerned with school health education.

* A Summary by the Chairman of the School Health Education Section of the Health Education Symposium, Western Branch, American Public Health Association, Oakland, Calif., July 23–28, 1939. The discussion leaders for the divisions of the Section were: (1) "Health Instruction in the Classroom," Dr. Edna W. Bailey, Professor of Education, University of California; (2) "Health Service in Schools," Charles E. Shepard, M. D., Professor of Hygiene and Physical Education, Stanford University; and (3) "Physical Education and Recreation," W. H. Orion, Director of Health and Physical Education, California State Board of Education.

2. To discuss ways and means of coöperative approach to the solution of problems.

OBJECTIVES AND COMPONENTS OF SCHOOL HEALTH EDUCATION

Two broad objectives should guide our plans and activities in school health:

1. To make it possible for every child to develop to his highest potential of health—physically, mentally, emotionally, and *socially*.
2. To provide in the curriculum for an understanding of and support for an adequate community health program as part of the education of every child.

In order to present the essential components of an adequate school health education program the problem may be considered under the following heads:

Health Instruction—The school administrator is responsible for all the areas of instruction in the curriculum, including health. As previously stated, the inclusion of health instruction in the school program came about largely through pressure groups. This development, however, led to the consideration by the educational leaders of the values of health to the individual—and their responsibility for proper attention to this area as a part of the curriculum. In the course of the reëxamination of the objectives of education, this resulted in health becoming one of the primary objectives of education.

While the translation of the facilities for making this objective attainable by the child has been slow and spotty, the discussion of the division on health instruction in the classroom indicated not only an acceptance of the objective but also an eagerness for aid in making this possible. Discussion of the basis for health instruction involves a consideration of three problems:

1. *Sound, scientific factual materials* are essential for the construction of an adequate inclusion of health instruction in the curriculum. While the teacher appeals to the medical and public health groups for assistance in providing, translating, and evaluating materials of instruction in all the fundamental areas bearing upon health, it is interesting that one of the requests of the public health groups is for a greater inclusion of just this type of material in the school health program.

2. *Scope of health instruction*—While the detailed scope of instruction could not be discussed, emphasis was given to the inclusion in health instruction of a consideration of the basic and contributory factors for healthful living. These might be classified under factors that:

   a. *Produce and Promote Health*—such as heredity, nutrition, excretion, exercise, rest, recreation, and adjustment to self and to the group.

   b. *Protect and Maintain Health*—such as control of communicable diseases including accidents, evaluation of health information and health advisers, protection of the special senses and community health services.

3. *Placement of health education materials* was found to be a technical matter in which the teacher is a better equipped individual than the medical or public health worker. We can function best by furnishing scientifically sound materials unless we have had training or experience in the field of education.

4. *Methods of Health Instruction*—The approach to health instruction was discussed from the standpoint of the older formalized subject matter method with direct teaching and the newer trend of a core curriculum with units of instruction.

Who is responsible for health instruction? What should be the relation of the health officer, school physician, nurse, dental hygienist, and other technical workers to classroom instruction? These technically trained workers can be effectively used to supplement and enrich the classroom instruction upon request of the teacher. But these workers should not replace the teacher in the classroom unless they are adequately trained in education. In general, the time of the public health nurse can be devoted to her field of individual health guidance and her activities that require technical preparation on a professional public health level.

Health Service in the Schools—The development of health service in the schools dates back to 1894 when Boston called the physician into the schools in

an effort to control communicable diseases. The evolution of the service from this single activity to the modern well planned program can be summarized in what have come to be generally accepted as the objectives and program of such a school service:

1. *Objectives*
 a. To control communicable diseases among school children.
 b. To discover and secure correction of handicaps where possible.
 c. To assist in providing and maintaining proper physical and psychological environment for the child.
 d. To provide technical advice and assistance for teachers.
2. *Program*
 a. *Health Examination*—In discussing the scope and frequency of the health examination, the value is seriously questioned when it is rapidly and superficially done, as is a common practice. Fewer and more thorough examinations are regarded as representing better practice than an annual inspection. Some believe that we should endeavor to shift the responsibility for the health examination to the parents through the family physician. There should be an evaluation of the items of the examination in terms of their diagnostic value and our ability to do anything about them.
 b. *Records*—The discussion of the character, purpose, and use of records elicited the trend toward a combined cumulative record. This led to a consideration of the problem of the legality and desirability of divulging certain information. There is general agreement that the result of the health examination should be made available to all teachers who need it through verbal or written interpretation by the examiner.
 c. *Follow-up service*—A well planned, adequately staffed follow-up service is essential if we are to secure a high level of benefit from the health services. The most important factor in the successful operation of this service is the public health nurse—who should have, in addition to her usual training in the fields of nursing and public health, a working knowledge and understanding of the principles of education.
 d. *Control of Communicable Diseases*—This is one of the primary responsibilities of the school health service through active coöperation with the health department where this department does not furnish the medical service.
 The plan of operation should include:
 (1) Daily health inspection by teachers and nurses
 (2) A system of exclusion and readmission of cases and contacts with communicable diseases—under medical supervision
 (3) Campaigns of immunization and tuberculin testing
 e. *Environmental Control*—It has become evident that it is desirable to make the supervision of the environment of the school the responsibility of a properly trained person. This should be assigned to the health service of the schools. It should include the control of the heating and ventilation, lighting, toilet and bathing facilities, the water supply—drinking, washing, and swimming—and the food supply.

In the school program these activities should be used essentially and basically as educational experiences rather than services.

PHYSICAL EDUCATION AS PART OF SCHOOL HEALTH EDUCATION

The representation of the physical education group in this Symposium and the discussion of the relationships of their activities to school health education were significant steps toward better coördination of all the factors in the school program bearing upon health. The basis for group discussion was the statement of policy for school board members and school administrators issued by the Society of State Directors of Physical and Health Education, entitled "The Public School Program in Health, Physical Education and Recreation." This policy recommends to school administrators all of the components of a well rounded school health program.

The objectives of a physical education program as viewed by this group are:

1. To protect and improve health.
2. To develop organic fitness and increase strength and neuromuscular control.
3. To develop desirable social attitudes and behavior.

4. To develop skills, habits, and attitudes in physical education activities which will contribute to wholesome, enjoyable leisure time pursuits.

This program was discussed in terms of the relationships to the other components of school health education. The work of this group of special workers should be considered an essential, fundamental part of the curriculum and not merely an activity grafted into the school program. Only by such an acceptance of these activities can the physical education program make its maximum contribution to the health of the child.

From the discussion, it also became clear that the group have a *desire* and a *need* for improved relationships with and services from the school medical service. Attention was given to the inadequacy or lack of health examinations and medical supervision — particularly in its relationship to athletics and the so-called "corrective" or adapted program of physical education. There are recognized opportunities and responsibilities for using these activities for personal and incidental health instruction.

It seems fair to conclude that if we are to develop the school health program to its maximum potential usefulness, the physical education group should be brought into closer working relationships, both in planning programs and in the conferences and meetings of our professional organization. The participation of this group in this Symposium is a step in the right direction. In a broader field the efforts on a national scale to coördinate the professional organizations should be commended and encouraged.

PROBLEMS AND NEEDS EMERGING FROM GROUP DISCUSSIONS

One of the significant by-products of the school health section was the emergence of the problems and unmet needs in this field. These could be very properly used as a basis for planning rather definitely the direction in which our future Western Branch activities should move.

To the writer, the most significant thing was the changed attitude of the special groups in seeing that their own activities are no longer self-sufficient, and the recognition of the need for help from the other groups. This attitude should be fostered and broadened to include the idea that we can *get* help of the other special groups but that we also have an equal responsibility to *give* them assistance in making their programs effective. Perhaps the most useful way to summarize these problems and needs is merely to state them briefly. There seems to be:

1. A need for an exploration, organization, and evaluation of the scientific materials that are required for sound health instruction.

2. A need for promoting a better mutual understanding of the plans, programs, and administration of the various components of a health education, official and voluntary, on federal, state and local levels.

3. A need to extend the areas of professional instruction of the health officer, dentist, public health nurse, and teacher to include a better working understanding of related fields.

4. A need for seeing more clearly the total health activities in schools in terms of the needs and interests of the child in relationship to the home and community.

5. A fundamental and dominant need for weaving all of these together, through better administrative relationships and more group planning, into a coördinated plan that will bring the highest potential benefits to the individual child and community.

The Differentiation and Identification of Bacillary Incitants of Dysentery*

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EVEN a casual review of the current medical literature impresses one with the relatively high incidence of outbreaks of enteritis of varying degrees of severity, especially in institutions and camps, and, in fact, in any assemblage with a common food supply. Frequently the incitant is a recognized type of dysentery bacillus, but on the other hand the etiology often cannot be established. The purpose of this paper is to discuss (1) media for isolation, (2) criteria for identification of dysentery bacilli, (3) the study of hitherto unrecognized incitants of enteric disease, and (4) serologic tests with patients' sera as an aid in determining the incitant.

Experience in the Division of Laboratories and Research of the New York State Department of Health is in accord with that of Hardy and his associates [1] who have reported that desoxycholate-citrate agar [2] is of marked value in the isolation of dysentery bacilli. Since this medium is subject to some variation apparently dependent upon inconsistencies in the ingredients, careful standardization and adjustment are essential. Leifson [2] found certain peptones unsuitable; in our experience different brands and lots of agar have varied and adjustment of the sodium citrate content has sometimes been necessary. Beef and horse meat infusion may be fully as satisfactory as pork infusion in the agar base. These variations do not detract from the value of the medium but are important factors in its use.

Another consideration with reference to desoxycholate-citrate agar is that complete reliance cannot be placed upon it for isolation of all types of dysentery bacilli. The growth of a relatively small number of strains of the Flexner group and an appreciable number of strains of *B. dysenteriae* Sonne is restricted. The inhibitory action on available strains of the Shiga type indicates that it is not suitable for the isolation of this species, but no reports have been found in the literature to confirm this observation.

Thus, at least one additional plating medium less restrictive than desoxycholate-citrate must obviously be used. Hardy [1] has reported that desoxycholate agar without citrate is suitable for this purpose. MacConkey's medium [3] may also be satisfactory, and our experience at the Albany laboratory would permit recommendation of eosin-methylene-blue agar [4] and a satisfactory modification [5] of Endo's medium.[6] In any case, careful standardization with known strains of the species sought is highly important.

The second point to be discussed is the establishment of criteria for identification of recognized types of dysentery bacilli. Determination of the biochemi-

* Read at a Joint Session of the Laboratory and Epidemiology Sections of the American Public Health Association at the Sixty-eighth Annual Meeting in Pittsburgh, Pa., October 17, 1939.

dulcitol. This microörganism has been isolated from feces from 6 patients residing in widely separated communities, all of whom were said to have symptoms of enteritis. Agglutination was obtained in a 1: 320 dilution of the serum from one of these and not in sera from normal individuals. Blood was not received from the other patients. The 6 strains are agglutinated in serum from a rabbit immunized with one of them. No antigenic relation to any other incitant of enteritis has been demonstrated.

A report of the second species has been published.[15] This is thought to be closely related to either *B. lignieri* or *Pasteurella pseudotuberculosis*. It is a Gram-negative rod with bipolar staining that is motile when grown at room temperature but not at 37° C. It produces an acid reaction in the butt or in the butt and slant of Russell's double-sugar agar and usually there is evidence of gas in this medium only after 48 hours' incubation. It forms indol and ferments dextrose, maltose, mannitol, saccharose, and xylose, but not dulcitol or rhamnose. It forms acid slowly in medium containing lactose. Five strains have been studied and all are agglutinated in serum prepared with one of them. Three were isolated in other laboratories in New York State and sent to Albany for identification, two from lesions about the face [16] and one at autopsy from an ulcer in the intestines. The other two strains were isolated in our own laboratory from feces from children having enteric disease. This microörganism is pathogenic for small laboratory animals; mice are readily infected by feeding, which suggests a possible means of dissemination.

Since these unidentified species have been readily obtained from the selective plating media used for isolating bacilli inciting enteric disease, it is to be concluded that they would not be easily overlooked and that infections with them are probably rare.

The fourth point concerns the demonstration of serologic properties in patients' sera. One is at once confronted with the impracticability of performing routine agglutination tests with all types of dysentery bacilli. Another difficulty is presented by the frequent occurrence of agglutination with members of the Flexner group in sera from apparently normal individuals. Furthermore, agglutinative properties for the homologous strain may not be demonstrable with the methods at present available. This was clearly demonstrated in a recent extensive outbreak in a large institution incited by *B. dysenteriae* Schmitz. Blood from 26 patients collected within the first 12 days after onset failed to agglutinate either the homologous or the standard strain of *B. dysenteriae* Schmitz. Sera from 5 patients collected 1 month after onset were also tested and 4 failed to agglutinate these strains. Serum from the 5th individual agglutinated the homologous strain in a 1: 80 dilution, but gave no reaction with the standard strain of *B. dysenteriae* Schmitz.

In spite of these limitations, the agglutination test with patients' sera often plays an important part in determining the etiologic significance of unidentified species. It may well be that other serologic reactions such as precipitation or complement fixation may be found more sensitive and specific than agglutination and hence of greater diagnostic import.

SUMMARY

The incitants of bacillary dysentery comprise a group of Gram-negative bacilli having highly diversified characters. A study of biochemical and serologic properties is essential to their identification and a uniform system of classification should be established.

As methods of isolation and means of identification are elaborated, hitherto unidentified species will undoubtedly be

recognized as incitants of enteric disease. Thus the public health laboratory is faced with the problem of a systematic study of the various types of bacteria found in feces from undiagnosed cases.

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An Outbreak of Shiga Dysentery in Michigan, 1938*

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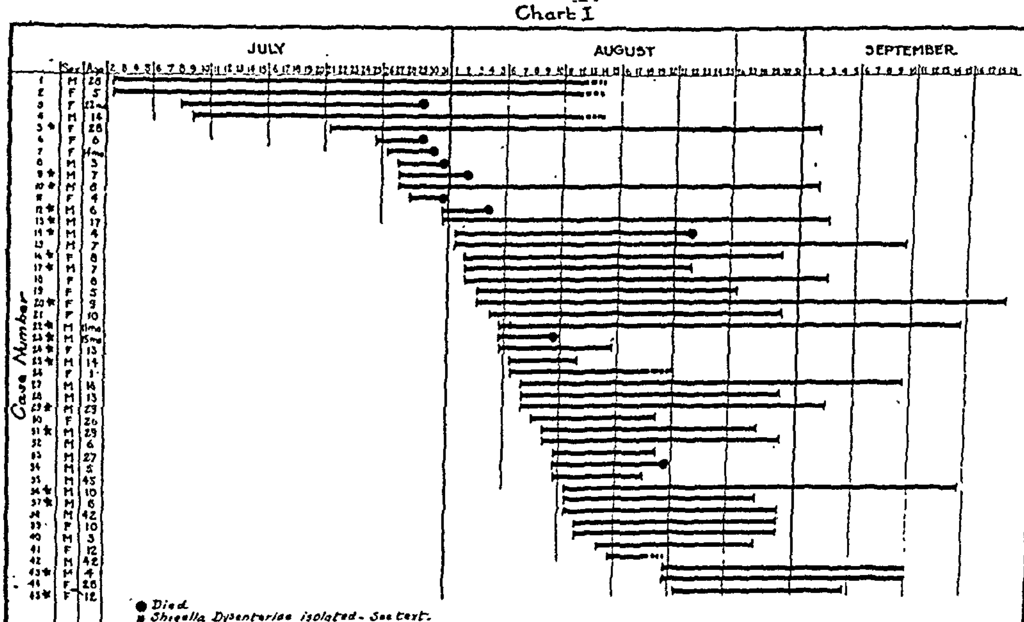
IN the summer of 1938 an outbreak of Shiga dysentery resulting in 45 known cases occurred in Owosso, Mich., and other parts of the state. The rarity of this disease in the northern states and the comparatively large number of persons involved are deemed important enough to warrant a description of the outbreak (Map I).

Attention was focused on the first cases in this outbreak when a physician was called on July 28, 1938, to visit 6 members of the "X" family living in one of the two tenant houses on a dairy farm 7 miles south of Owosso. The other tenant house was occupied by a middle aged man living alone who did most of the work in the dairy. He proved to be symptom free, and laboratory reports of fecal specimens were negative. The owner, "Y," lived in a third house on the farm.

Chart I

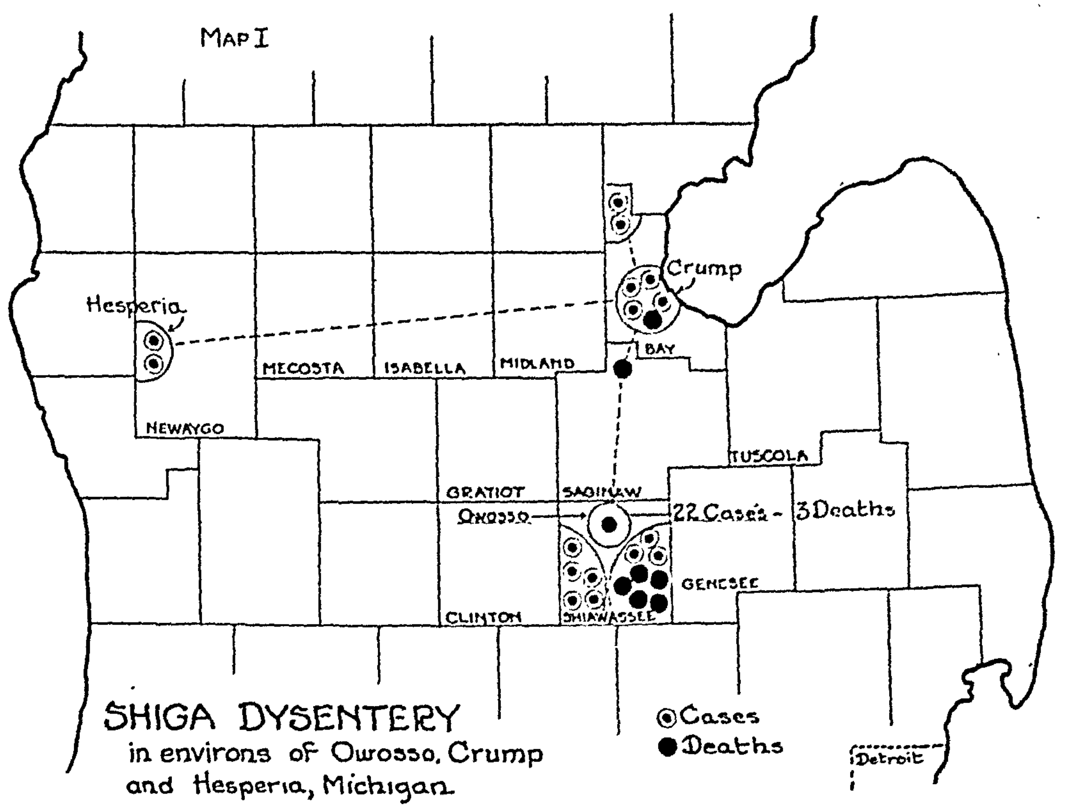


SHIGA DYSENTERY — Date of onset and duration of disease.

Of the 7 members of the "X" family, 6 had become suddenly ill with a violent bloody diarrhea. The mother (case 5)† was the first to succumb to

* Read at a Joint Session of the Laboratory and Epidemiology Sections of the American Public Health Association at the Sixty-eighth Annual Meeting in Pittsburgh, Pa., October 17, 1939.

† Case Numbers are listed according to dates of onset as on Chart I.



the distressing symptoms. Her date of onset (July 21) was followed in rapid succession by the dates of onset of her 5 children (cases 6, 7, 8, 9, 10). Because of prostrating toxic symptoms and the utter impossibility of caring for the family in their poverty stricken home, the doctor on his first visit ordered that they all be admitted immediately as emergency cases to the Owosso Memorial Hospital. The severity of the initial symptoms might be accounted for in part by the fact that the family had been on inadequate rations for some time and all showed signs of poor nutrition. The only person not affected at the time was the father (case 31) who subsequently contracted the disease in a mild form and remained ambulatory throughout.

The 4 year old daughter (case 11) of "Y," the owner of the dairy farm, had a history of diarrhea which began July 20. It became bloody in type on July 28, but because of religious scruples a physician was not called. The child died in the home on July 31, which was the date on which a 17 year old delivery boy (case 13), the first case to be reported in the city of Owosso, entered the hospital with a chief complaint of bloody diarrhea. He recalls that he delivered a catalogue to the home of "Y" on July 22, and loaned his pencil to the 10 year old son to sign for it. The 4 year old child, whose symptoms began 2 days previously, was absent from the premises at that time.

On July 29, the first child (case 6) in the "X" family died, after having been in the hospital but 1 day. On July 30, the second (case 7), on July 31, the third (case 8), and on August 2, the fourth (case 9) death occurred in the family. Also on August 2, an Owosso child of 6 years (case 12), suffering from a bloody diarrhea, was admitted to the hospital and died 2 days later.

The symptoms common to all these patients were: a sudden onset of violent, almost continuous diarrhea which immediately or very soon became bloody,

accompanied by nausea, vomiting, restlessness, irritability, and a moderate rise in temperature. Signs of dehydration appeared very early. Excruciating abdominal pain and tenesmus were present, and very often, especially in the younger children, a prolapse of the bowel or a constant hemorrhage from the rectum was noted.

DIAGNOSIS

A search for the causative agent was made in the fields of toxicology, protozoölogy, and bacteriology. Reports in the first two fields were negative. *Shigella dysenteriae* variety Shiga was isolated on August 5 from cultures of necropsy material from case 9 (the first time this organism had been isolated in the state laboratories).

The findings on case 9 are recorded in detail as a typical case, and the one on which the diagnosis of the outbreak was made.

Case 9. L. B., Age 4 Years

Date of onset—7–27–38. Date of death—8–2–38. *Chief complaint:* Violent bloody diarrhea. *Past History:* Generally under par for some months, otherwise not essential. *Family History:* Father was living and well; mother ill with the complaint of violent diarrhea; brothers, two, ill with the same complaint; sisters, three, two ill with the same complaint. (One sister who was living with the grandmother was well, and does not enter into the picture as she had not been living at home for some months and had not visited or been visited by members of the family.) *Physical Examination:* Head — no abnormalities noted except dryness of mucous membrane; Neck—no glands enlarged; Chest—Lungs—voice sounds and breath sounds normal, no rales. Heart—not enlarged, normal rhythm, no murmurs; Abdomen—scaphoid, no distention, no masses or organs palpated, diffuse tenderness. *Laboratory Work:* Blood Study: (7–28–38) Hemoglobin—85% (Sahli); White blood cells—27,000, 6% Lymphocytes, 2% Large Mononuclear cells, 22% Neutrophils, segmented, 60% Neutrophils, non-segmented, 10% Metamyelocytes.

Signs of dehydration were present on entrance to the hospital. The violent diarrhea continued, became almost constant, and the child's condition rapidly grew more serious. Shreds of mucus, pus, fresh and occult blood were discharged from the bowel. On the seventh day of the disease (8–2–38) the child died. A post-mortem examination was made 6 hours after death and necropsy specimens were sent to the Michigan Department of Health and the University of Michigan Pathology Department.

The *Autopsy Report* of the Colon reads as follows: "Extremely severe necrotizing ulcerative and hemorrhagic colitis. Practically no mucosa remaining. The hemorrhagic process extends to the muscle in practically all regions and in some areas involves the complete thickness of the circular muscle coat. The necrotic surface is covered with an almost continuous layer of bacteria."

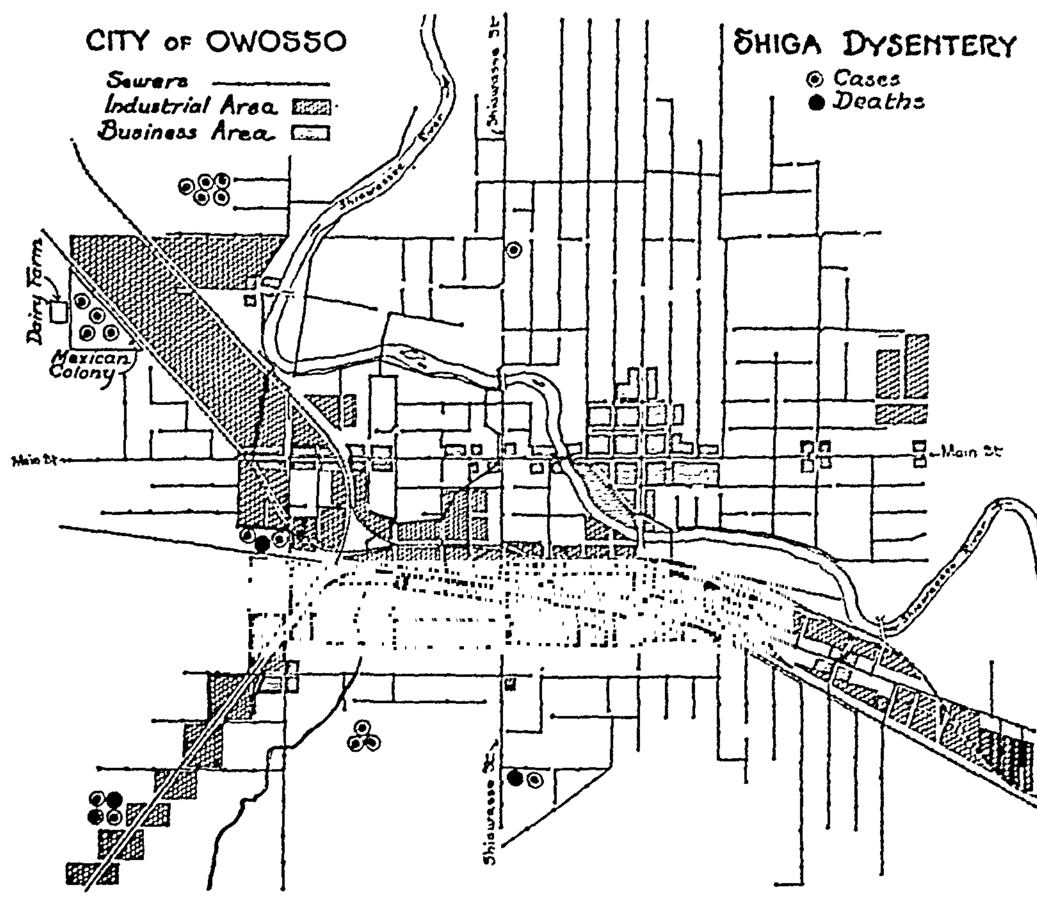
BACTERIOLOGY

Washings from the small and large intestine were made and streaked on Endo, and MacConkey plates. Poured plates of bismuth sulphite were also made with the washings as inoculum. From the 30-odd plates that were streaked with dilutions of the intestinal contents only 2 non-lactose fermenting colonies proved to be *Shigella dysenteriae*, variety Shiga.

Identification of the organism was made on the basis of biochemical, serologic, and stain reactions. The reaction on triple sugar was typical of dystentery organisms—alkaline slant, pink butt, no gas, no H_2S produced. In single sugars dextrose and levulose were fermented; lactose, sucrose, maltose, mannite, xylose, dulcite, and inosite were unaffected. Indol was not formed after growth in tryptone water for 72 hours, and the organism was not motile after 4 hours' and 24 hours' growth in nutrient broth. Gelatin was not liquefied in 168 hours. The staining reaction was Gram-negative.

With two lots of specific Shiga antisera, one lot furnished by Parke, Davis & Co. and the other by Lederle & Co., the organism was agglutinated in a 1:1280 dilution of both sera. Flexner polyvalent antiserum failed to agglutinate the bacteria in the low dilution of 1:80.

MAP II



Because of the failure of the central laboratory in Lansing to isolate anything of significance from shipped specimens, a field laboratory of the department was established in Owosso to plate specimens as soon as they were obtained. The routine procedure in this laboratory was to emulsify the fecal specimen in physiological saline, making a heavy suspension, and to inoculate a plate of bismuth sulphite. The material was further diluted and 2 plates of Endo medium, and 2 plates of MacConkey medium were streaked serially from this inoculum.

It was found that MacConkey medium was particularly valuable for isolation of Shiga organisms, since it was less inhibitory than the Endo medium employed and yet did not permit an overgrowth of lactose-fermenting bacteria. Practically without exception more colonies of Shigella were found on MacConkey medium than on Endo, and the colonies were larger in size. It was also easier to distinguish different types of non-lactose-fermenting colonies on MacConkey medium.

It has been the experience of many state laboratories that the recovery of *Shigella dysenteriae* from shipped specimens, with or without preservatives, is generally unsuccessful.* Our own experience in the early cases, and subsequent attempts at isolation, resulted in failure. At the field laboratory stools from known cases of Shiga dysentery were divided, part placed in the usual fecal container with 30 per cent glycerine solution as a preservative, and the other part cultured immediately. The preserved specimens were sent to the

* Confidential Communications.

Central Laboratory and cultured about 24 hours later. Out of 10 specimens from which *Shigella dysenteriae* was isolated from the fresh stool not a single isolation was made from the preserved portion. The stools were teeming with dysentery bacilli and with comparatively few coliform organisms.

The experiments with shipped specimens, while few in number, agree with the experiences of others and confirm their opinion that at present *Shigella dysenteriae*, especially the Shiga variety, must be isolated from fresh fecal specimens.

From our observation bacteriological examination of the fresh feces was necessary within an hour after passage for successful isolation of *Shigella dysenteriae*, although in a few instances the organism was isolated when the stool had been obtained 2 hours prior to plating.

On August 6, a Mexican boy, age 14 (case 25), from the Mexican colony in the northwest section of Owosso (see Map II) was admitted to the hospital and a diagnosis of Shiga dysentery was made after isolating the organism from fecal specimens.

Deaths continued to occur (see Chart I), and by August 6, more than 45 cases of diarrhea were reported. *Shigella dysenteriae* variety Shiga was isolated from fecal specimens obtained from ambulatory cases presenting only mild symptoms as well as from hospitalized cases with severe symptoms. A description of the more significant cases will be brought into the text. For the complete list of those involved see Chart I.

Case 35, who was living outside the city but working in the Owosso Hospital, was placed as an orderly in the isolation unit on July 28, when the 6 patients from the "X" family were admitted. He became ill with bloody diarrhea on August 10. Although the organism was not isolated in his case, his family of 5 had similar symptoms of varying degrees, and the organism was isolated from stool specimens of his two sons.

Also, on August 10, it was reported from Bay City, some 55 miles north of Owosso, that from one family, 4 children with a complaint of severe bloody diarrhea had been admitted to The General Hospital. The symptoms described were identical with those of the patients with Shiga dystentery, and within a few days, *Shigella dysenteriae* variety Shiga was isolated from fecal specimens of 2 of the children, one of whom died.

These children (cases 14, 15, 20, 37) lived on a farm near Crump, about 15 miles north of Bay City, 70 miles north of Owosso (see Map I). It was found that about 2 weeks before the onset (August 1) of these cases, "Z" (case 1) and his family had come from the Mexican colony in Owosso to work in the beet fields on a farm almost directly across from their home. He and his baby daughter (case 2) had had bloody diarrhea since early in July. On their way from Owosso to Crump they stopped over night in a camp which also sheltered a Mexican family in which there was a 22 months old baby (case 3) with pertussis. Within a few days that baby developed a bloody diarrhea and died. Some time after they arrived in Crump a frail Mexican baby (case 26) in the home where they made a short stay contracted a violent bloody diarrhea and recovered only after a prolonged illness. "Z" and his daughter and the 4 children (cases 14, 15, 20, 37) frequently met at a third farm, where they went regularly for the family supply of milk and water and were known to use a common drinking cup. The day before the investigation was made in this vicinity he and his family again had moved to an unknown destination.

Cases 28 and 42 (son and father respectively) who lived in the same

neighborhood frequented the farm on which the above 4 children lived, and were there for a threshers' dinner just prior to the onset of their illnesses. Within the next few days (August 7) the son was critically ill with a violent bloody diarrhea, became emaciated, and remained in bed for 5 weeks. Shortly after, his father presented similar symtoms, though less severe. No pathogenic organisms were isolated in either case, but the diagnosis of Shiga dysentery was made on clinical and epidemiological evidence.

The "Z" family was finally located near the end of August in temporary quarters at Hesperia on the far western side of the state and the authenticity of his itinerary confirmed. While they were being interviewed 2 cases of bloody diarrhea in a family, mother and son (cases 44 and 43 respectively), living on the next farm were reported, and *Shigella dysenteriae* variety Shiga was isolated from specimens of the 4 year old boy. The acute stage of the disease, as far as "Z's" family was concerned, had passed, and no organisms were isolated but they gave a history of having had one or more members in the family suffering from severe bloody diarrhea during July and the first 2 weeks of August. No deaths had occurred in his family, so he did not consider it seriously.

From August 10 to 25, reports of persons ill with diarrhea continued to come in, until a total of 159 cases were on file. During the last 5 days of the month only a few new cases were reported, and by September 1 most of the 32 hospital patients had been released. By September 6, the outbreak had practically subsided.

CLASSIFICATION OF CASES ACCORDING TO CLINICAL AND LABORATORY FINDINGS

Of the 159 cases of diarrhea reported during the outbreak, 90 had, as a chief complaint, bloody diarrhea.

Forty-five of the 90 cases were diagnosed as Shiga dystentery. This was confirmed in 19 instances by isolating *Shigella dysenteriae* variety Shiga from fecal specimens. The remaining 26 were diagnosed on clinical or epidemiological evidence, or both. These patients were either members of families in which Shiga dysentery was present or where contacts with cases of Shiga dystentery outside of the household were known.

Failure to recover the organisms from fecal specimens in the above 26 cases may be attributed, so far as one could determine, to the following factors and conditions:

1. Specimens shipped to the central laboratory proved to be valueless.
2. Many of the cases were past the stage in which the organism was present in the feces by the time a field laboratory had been established. In some instances the patients were transient laborers and not located until the acute stage had subsided.
3. Death of the patient ensued in some of the early cases before specimens could be obtained.
4. Laboratory technic may not as yet have reached the point where the organisms could be detected in all specimens.
5. A few cases, if any, may not have had Shiga dysentery.

If conditions were right for the spread of *Shiga dysenteriae,* it is quite possible that they were also right for the spread of the various types of *Shigella paradysenteriae.* The variety Hiss-Y was isolated in 5, and the variety Sonne was recovered in 23 instances. We then were probably not dealing with two or three simultaneous outbreaks but with one in which the cases were caused by either dysentery or paradysentery. No mixed cases were discovered. That is, there were no cases in which both dysentery and paradysentery organisms were isolated from the same fecal specimen, and no families in which both types were found.

The remaining 17 of the 90 patients who complained of bloody diarrhea showed negative laboratory findings and

had no known contact with any of the known cases. For that reason they were not diagnosed Shiga dysentery. However, the dates of onset ranged within the same time interval as those having Shiga dysentery, and many of them complained of symptoms which were equally severe. The clinical diagnosis in this group ranged from "colitis" to "bloody dysentery."

Of the 159 cases reported and studied, there still remain 69 unclassified cases of diarrhea in which patients complained of mild to severe symptoms and no bloody rectal discharge. No organisms of the bacillary group were isolated.

CASE INCIDENCE

There were 17 families in which Shiga dysentery was diagnosed; 88 persons definitely exposed. Forty-five cases of this type of dysentery resulted, an incidence of 51.1 per cent. The average age of those who contracted the disease was 13 years and 3 months.

FATALITY RATE

Among the 45 cases of Shiga dysentery there were 10 deaths, a fatality rate of 22.2 per cent. The average age of those who died was 3 years and 11 months, all under the age of 8 years.

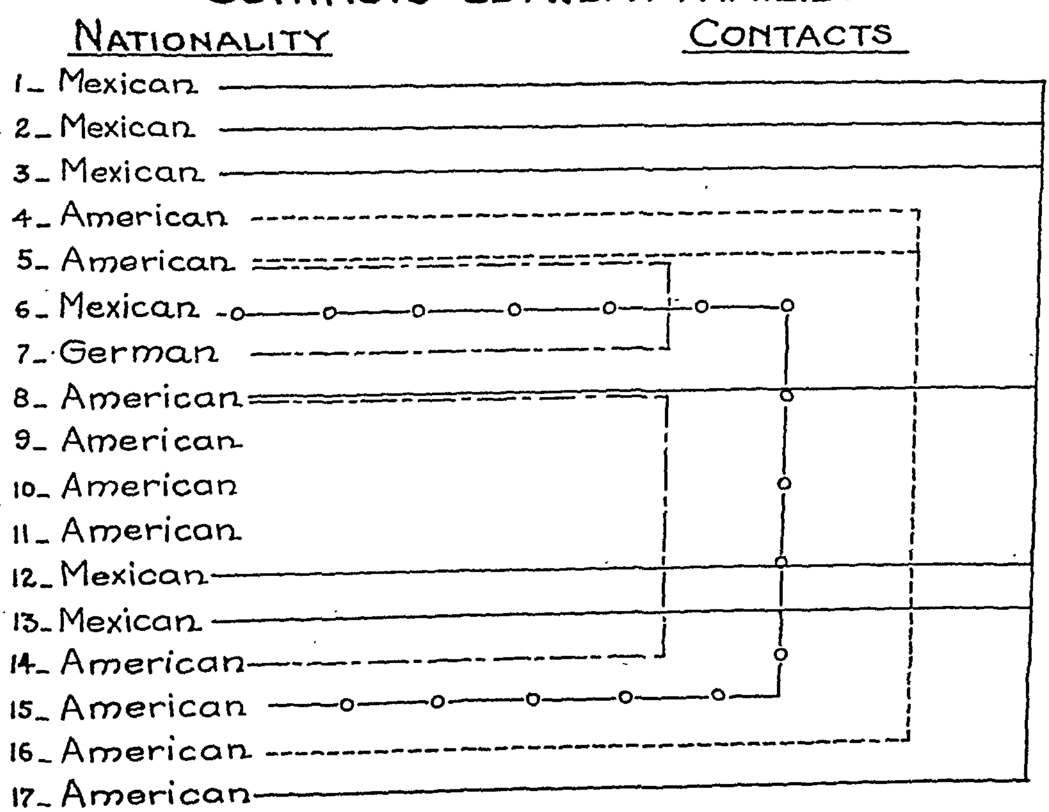
ENVIRONMENTAL FACTORS

Family Contacts — Contacts with known cases could not be established in all instances; those known to have occurred are shown in Chart II.

Housing Conditions—With very few exceptions, the persons who contracted Shiga dysentery came from underprivileged homes—45.4 per cent of the families lived in rural areas; 54.6 per cent lived in the City of Owosso. Approximately 93 per cent came from homes in which the situation with

Chart II

CONTACTS BETWEEN FAMILIES



regard to cleanliness, sanitation, and housing conditions may be rated as poor or exceedingly poor—obviously below the general level of the rural district or community in which they lived. The food served in the homes did not, in many instances, meet the requirements for good nutrition, hence one may also say that most of the persons exposed to the disease, especially the children, were physically under par.

Common Meeting Places—There was found to be no common grocery store or meat market, though many patronized a common chain store. There was no common drug store, bathing beach or pool, and no common church connection. There was a carnival in the outskirts of Owosso where food was served, but only a small percentage attended (7 per cent).

Milk Supply—There was no common milk supply, though it may be of significance that a small dairy located at the edge of the city and across the street from the Mexican settlement (see Map II) was patronized by several families in which Shiga dysentery was diagnosed. The milk was not pasteurized, and was sold in large quantities. Among those going regularly for milk were several Mexican families including cases 4 and 25; a family in which a child (case 34) died from bacillary dysentery 10 days after leaving Owosso to visit a relative in another state*; a family in which a 6 year old child (case 12) died of Shiga dysentery in the Owosso Hospital, and a family in which 2 members suffered from severe bloody diarrhea caused by *Shigella paradysenteriae* variety Sonne. Among members of the family on the dairy farm there were no complaints that would suggest dysentery. Stool specimens submitted were negative for organisms of the typhoid-dysentery group. The general sanitation about the farm was exceedingly poor. There was a common drinking cup at the well and several patients remembered having used it. The well water was reported "not dangerously contaminated."

Sanitary Conditions in the Parts of Owosso Where There Was an Incidence of Shiga Dysentery—The cases involved in the outbreak in the City of Owosso lived west of the center of the city (see Map II). In the northwest and southwest sections there are industrial areas as well as poorer residential quarters. In the northwest section is located a settlement for transient Mexican laborers where about 100 men, women, and children lived. This settlement served as temporary headquarters from which the laborers and often whole families went to various parts of the state to work in beet fields and vegetable gardens.

Conditions in and about the settlement were extremely poor. The 14 houses located within an area representing about one-half a city block were in disrepair, inadequately screened, and unclean. There were no sewer connections and no sanitary toilet provisions. One community hydrant carrying city water served as the water supply. With one or two exceptions, the personal hygiene was in keeping with the environment.

There had been repeated reports of bloody diarrhea among these people which dated back to the early part of July. When case 25 entered the hospital on August 6 his history showed that he had had as a playmate a former patient (case 4), who was admitted July 10, and discharged from the hospital July 17, a short time prior to the admittance of the "X" family (July 28). At that time no one thought the complaint "bloody diarrhea" of undue concern, and a diagnosis of "severe colitis" was made. Since case 4 could not be located

* Laboratory work done in Lafayette, Ind., Home Hospital. Laboratory Diagnosis: Bacillary dysentery, type unknown. Diagnosis based on clinical and epidemiological evidence, Shiga dysentery.

after the outbreak began, his history was obtained from case 25 and it was found that he had lived in the same house with "Z" (case 1) and had helped care for his small daughter (case 2). Clinical and epidemiological evidence seemed strong enough to include him in the series.

Since *Shigella dysenteriae* variety Shiga had been isolated from fecal specimens of one patient (case 25) in the Mexican colony and since there was clinical and epidemiological evidence against 3 others, specimens were requested from all persons on the premises. *Shigella paradysenteriae* variety Hiss-Y was recovered in 1 case. It was difficult to obtain coöperation, and those submitting specimens denied having had an acute bloody diarrhea. The authenticity of the specimens was questioned since it was felt that many were interchanged.

Water Supply—The water supply for the City of Owosso met the approval of the State Department of Health and no indication could be found that there had been a temporary lapse in the quality of the water. Many living outside the city limits and several within the city limits who contracted dysentery used water from private wells. Several of these wells were found to be "dangerously contaminated."

Sewage Disposal—The Bureau of Engineering of the Michigan Department of Health reported: "The sewage plant does not provide sufficient treatment for the city liquid waste during the summer months when the local cannery is in operation."

Sewer connections are not available in all parts of the city, especially in the northwest and southwest sections, the same parts of the city in which infection was most prevalent (see Map II).

The Bureau of Engineering also found: "Stream surveys have shown an increasing bacterial count through the city. This is probably due to separate sewer connections directly to the river or inadequate maintenance of storm water overflows on the intercepting sewer."

COST OF THE OUTBREAK

Twenty-four cases of Shiga dysentery and 8 cases of other types of dysentery (see Table 1) were hospitalized.

The actual expenditure of Shiawassee and Bay Counties for medical care and hospital maintenance of the patients afflicted was $6,351.54 plus $150.00 for burial expenses. All hospitalized patients were indigent.

A report given to the Shiawassee County Supervisors by a local business man shortly after the outbreak stated, "A tentative estimate of financial loss to business men and farmers of the community is placed at $40,000."

SUMMARY

1. An outbreak of Shiga dysentery resulting in 45 known cases occurred in Michigan in the summer of 1938. From fecal specimens of 19 cases the organism known as *Shigella dysenteriae* variety Shiga was isolated. In 26 cases the diagnosis of Shiga dysentery was made on a clinical or epidemiological basis since the patients were either members of the same family or had had contact with bacteriologically diagnosed cases. *Shigella para-*

TABLE 1

Type of Dysentery Organism Isolated	*Hospital*	*No. of Patients*	*Patient Days*	*Days per Patient*	*Maintenance Cost*	
					Total	*Per Patient*
Var. Shiga	Owosso	20	360	18.0	$3,096.07	$154.80
	Bay City	4	376	94.0	2,533.87	633.47
	Both Hosp.	24	736	30.7	5,629.94	234.58
Var. Sonne / Var. Hiss-Y	Owosso	8	84	10.5	721.60	90.20
Total	Both Hosp.	32	820	25.6	$6,351.54	$198.48

dysenteriae variety Sonne was isolated in 23 cases and *Shigella paradysenteriae* variety Hiss-Y in 5. One hundred and fifty-nine cases of diarrhea comprised the total number reported and studied. Ninety gave as a chief complaint "bloody diarrhea."

2. Of the homes investigated 93.2 per cent were classified as "poor" or "exceedingly poor." All hospitalized patients were indigent. Of the families involved, 54.6 per cent lived in the city of Owosso; 45.4 per cent lived in rural districts. In 3 instances rural cases in geographically widely separated areas followed in the wake of a transient laborer against whom epidemiological evidence was so strong as to warrant the diagnosis of Shiga dysentery.

3. There is no clear evidence that the disease was spread by food or water, but there is evidence, not at all striking, that a few of the cases may have been milk-borne.

4. Direct contact was established in several instances as the outbreak progressed, but the "X" family on whom the diagnosis of Shiga dysentery was first made gave no history of contact with known cases prior to their dates of onset.

5. The disease was of a virulent type, causing 10 deaths among 45 patients, a fatality rate of 22.2 per cent. The average age of those who died was 3 years and 11 months.

6. Bacteriological confirmation of the clinical diagnosis was obtained only when the inoculation on culture media was made within a very short time after the fecal specimens were passed, 1 hour being approximately the time limit to insure good results.

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HEALTH is much more than the freedom or recovery from disease. It is a way of life, a balance, a compromise sometimes, worth sacrificing other desires or ambitions to achieve, and the most precious possession a person may lose or feel compelled to give up in exchange for other ambitions.—HAVEN EMERSON—*Pub. Health Rev.*, Univ. of Michigan, 9, 3 (Dec. 15), 1939.

Studies of the Acute Diarrheal Diseases*†

III. Infections due to the "Newcastle Dysentery Bacillus"

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THE variety of the "dysentery bacillus" discussed in this paper was first isolated by Clayton and Warren [1] of Newcastle, England, in 1925, and was subsequently designated the "Newcastle dysentery bacillus" by these workers.[2] They first obtained it from the feces of a girl who was suffering from diarrhea. Her entire family had been similarly affected within a period of 6 weeks. Her stools were watery and contained mucus, many pus cells, some red blood and epithelial cells. Many non-lactose fermenting colonies were found on the plates inoculated with the fecal material, but subsequent study of transfers from these colonies showed that the organisms did not conform to any previously described strains of Shigella or Salmonella. Three years later the same workers obtained similar organisms from a small epidemic of diarrhea in a children's home and from a second family outbreak in which there were two rapidly fatal infections in a boy of 5 and a girl of 8 years. Soon thereafter 3 hospitalized cases, 1 fatal and 2 with relatively mild but recurring disorders, yielded organisms with the same distinctive cultural and bacteriological characteristics. The clinical notes and bacteriological findings concerning these cases were published in two communications (1928 and 1929) with the conclusion that "the evidence suggests that these organisms may be responsible for the disease condition."

An entirely independent study of dysentery in India led to the identification of a similar variety of organism. Boyd [3] has reported the classification of over 7,000 isolations of Shigella. The well known varieties accounted for 80.9

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* From the National Institute of Health, Division of Infectious Diseases, Dr. R. E. Dyer, Chief; with the coöperation of the DeLamar Institute of Public Health, Columbia University, New York, N. Y., and the following health departments or agencies. New Mexico State and Bernalillo County; Georgia State and Dougherty County; New York City (Divisions of Preventable Diseases and Laboratories); New York State, through the District Office at Middletown; and the Indian Medical Service.

† Read at a Joint Session of the Laboratory and Epidemiology Sections of the American Public Health Association at the Sixty-eighth Annual Meeting in Pittsburgh, Pa., October 17, 1939.

per cent of all; Flexner 50.2 per cent, Shiga 14.3 per cent, Sonne 10.9 per cent, and Schmitz 5.5 per cent. The remaining organisms were separated into serological groups, and examined in detail with regard to cultural characteristics and probable pathogenicity. The largest group, known by the number of the type-strain, 88, accounted for 5 per cent of all isolations. These organisms were described in detail in 1932 [4] and it was at that time concluded that they were one of the causes of dysentery. Four years later Boyd [5] reported that these had been found to be identical in antigenic composition to the "Newcastle dysentery bacillus." At that time he recorded 231 isolations from cases of clinical dysentery, 8 from "menials undergoing routine examinations" and 1 from a convalescent case of typhoid fever. Dysentery cases of similar type occurring in this country probably would be considered relatively severe, since most revealed the bloody mucus characteristic of the more severe forms of the disease.

Downie, Wade, and Young [6] in 1933 reported five additional isolations from non-fatal diarrheal disorders in England and 1 from a relatively mild case of dysentery in Nigeria. The following year Whitehead and Scott [7] described 2 additional isolations, 1 from a fatal case in a boy of 12 years and the other from a severe infection in his brother, aged 8 years. A sister of 11 years was also admitted to hospital for a similar clinical disorder, but her recovery was prompt and no stool specimens were submitted for bacteriological examination. In South America, Hormaeche, Surroco, and Aleppo,[8] working in Uruguay, reported the isolation of 13 strains of this organism in 10 cases, with 6 fatalities. Apart from our own observations we have not found any published reports of the identification of the "Newcastle dysentery bacillus" in the United States, though Meyer [9] in California recently isolated an organism which conformed closely to this type.

Morphologically these organisms have been found to be Gram-negative, non-flagellated bacilli indistinguishable from other varieties of Shigella. With one possible exception it is agreed that they are non-motile. The Nigerian strain was thought to be motile on isolation but later, on repeated observations, it was found to be non-motile. This early, unconfirmed and atypical observation appears of very questionable significance. The indol reaction was consistently negative. Considering only the sugars commonly employed, all strains failed to ferment lactose, saccharose, or xylose, but promptly fermented glucose. Mannitol was not fermented by the strains isolated by Clayton and Warren[1, 2] or those described by Whitehead and Scott,[7] but was fermented by those isolated by Boyd,[4, 5] by Downie, Wade, and Young,[6] and by Hormaeche and coworkers.[8] Dulcitol was fermented late (2–10 days) by most of the organisms. A further variation in biochemical reaction is one which is customarily given much weight in classification. The first observers reported that when the various sugars were prepared with a peptone water base, a very small amount of gas was sometimes formed in those sugars which were fermented, but with an extract broth base (Lemco broth) there was very definite gas production. All described English strains have been found to produce at least a little gas. On the other hand, with one exception, all of Boyd's strains failed to produce any gas in either base but he points out that until recently non-motile gas formers were discarded. All South American isolations conformed in character to Boyd's "88." The type strain received by us from the Standards Laboratory, Oxford, England, is a moderately active gas producer when grown in an extract broth base, but in peptone water produces no gas which is demonstrable in

the Dunham fermentation tube. When it is grown in either Russell's or Krumweide's medium, three or four bubbles of gas appear.

In marked contrast to the variation in cultural findings it is agreed that antigenically the "Newcastle dysentery bacillus" is a sharply defined entity. There is a striking lack of any mention of even slight variations in serological reaction. Agglutinin absorption tests were reported by all of the authors quoted and they consistently concluded that in antigenic composition these organisms are identical.

The relationship to other pathogens has also been examined. Organisms which failed to show any significant cross-agglutination include *Eberthella typhosa, Shigella dysenteriae* Shiga, *S. dysenteriae* Sonne, *S. alkalescens* and a wide variety of Salmonella. There was, however, a definite cross-agglutination with certain of the Flexner strains. Absorption of Newcastle antiserum by a mixed Flexner suspension, as reported by Clayton and Warren,[2] removed all the Flexner agglutinins with only a very slight effect upon the agglutinins for the "Newcastle dysentery bacillus."

The sera of the patients, from whose stools the Newcastle organism had been isolated, were examined for specific agglutinins. The English investigators found titers of 1/40 to 1/640 in all clinical cases examined late in the disease or early in convalescence. The Nigerian case was serologically negative. Boyd[5] tested 68 cases and 52 showed no agglutination, 1 was positive in 1:25; 7 in 1:50; 4 in 1:125; and 4 in 1:250 dilutions or over. Some of the reported cases were also tested using Sonne and Flexner antigens. The results for the former were consistently negative and all but one failed to show any significant agglutination of any Flexner strain. Serum in the 1 case agglutinated the "Newcastle" organism in 1:640 dilution, and was positive with Flexner Y in 1:80 but negative with the other Flexner strains in 1:40 and above.

The British opinion concerning pathogenicity is indicated by Topley and Wilson[10] who include the "Newcastle dysentery bacillus" among those organisms which "undoubtedly give rise to dysentery in man."

OBSERVATIONS IN THREE REGIONS IN THE UNITED STATES

The plan of the study in Bernalillo County, New Mexico, and the laboratory procedures employed have been described in the first paper of this series.[11] During three summer and fall seasons we cultured 11,557 fecal specimens. On the average, one-third of these were collected from the individuals who were ill, or had recently recovered from an acute diarrheal disorder. The remainder came from recovered positive cases, from the healthy familial contacts, and from a generous sampling of representative population groups. Some one of 3 types of *Shigella dysenteriae* was isolated from 2,071 specimens and 2 varieties each from 5, thus providing 2,081 isolations. Approximately 80 per cent of each of the 3 organisms came from specimens collected from individuals who were or had recently been ill. It is seen in the tabulation that the "Newcastle dysentery bacillus" accounted for 332 (15.9 per cent) of the isolations, Sonne for 397 (19.1 per cent), and the Flexner group for 1,352 (65.0 per cent). Considering the subdivisions of the latter, the Flexner W strain was the most common of all the organisms, but 3 other members of this group were each encountered less frequently than either the Sonne or the Newcastle. The differences in the total per cent positive for the three seasons is largely explained by the adoption at the beginning of the second year of the more effective cultural procedure described elsewhere.[11] In addition, how-

ever, our records show a relative increase in the proportion of "Newcastle dysentery bacilli" from 7.1 per cent in 1936, to 14.4 per cent in 1937, and 17.0 per cent in 1938. This organism was first recognized by us during the winter of 1936–1937 in the course of the study of supposedly atypical strains. It was subsequently noted that the colonies on the medium used exclusively during the preceding summer (eosin-methylene blue with an extract agar base) were usually distinctly bluish. Failure to pick such colonies regularly possibly explains the relatively low percentage of "Newcastle dysentery bacilli" in the first year. The increase from the second to the third year reflects in part our increasing determination to obtain an adequate "follow-up" of all infections with this newly recognized organism. Our data do not permit us to conclude whether there was or was not any true increase in the incidence of "Newcastle" infections in this area.

In May, 1939, two of us (J. W. and T. DeC.) began a study in Dougherty County, Georgia, comparable to the one which we have completed in the Southwest. During the early weeks attention was restricted to case finding and diagnosis. Thus a majority of the specimens examined prior to September 1 were from individuals who were or had been ill. In the 4 months 737 specimens were examined and 157 yielded an identified variety of Shigella dysenteries. The 3 varieties were represented as follows: "Newcastle" 50 (31.8 per cent), Sonne 13 (9.0 per cent); and Flexner 94 (59.2 per cent). Organisms from other areas of Georgia were also sent to our laboratory for identification, and among these were found Newcastle strains. It is evident that in Georgia the "Newcastle dysentery bacillus" is widely scattered, and in Dougherty County formed an even greater percentage of the total isolations than in New Mexico.

In mid-June, 1939, through the cooperation of the Divisions of Preventable Diseases and Laboratories of the New York City Department of Health, an investigation of diarrheal diseases occurring in Manhattan was also undertaken. During the latter part of June there occurred an explosive epidemic involving chiefly the nurses in one of the larger hospitals in the city. There were 97 cases and the diagnosis was established bacteriologically in 77 of these. Twenty-three sub-clinical infections were also identified. The "Newcastle dysentery bacillus" was isolated from 248 fecal specimens examined in one or another of three different laboratories. All concerned with the study of the epidemic were strikingly impressed by the almost pure cultures of the "Newcastle" organisms commonly obtained from fecal material in the

TABLE 1

The Findings on Stool Cultures in Bernalillo County, New Mexico, During Three Summer and Fall Seasons

	Fecal Specimens Positive for "Shigella Dysenteriae"							
	1936		1937		1938		Total	
Variety of S. dysenteriae	No.	%	No.	%	No.	%	No.	%
"Newcastle"	11	7.1	84	14.4	227	17.0	332	15.9
Sonne	50	32.5	119	20.4	228	17.1	397	19.1
Flexner	93	60.4	379	65.2	880	65.9	1,352	65.0
Total	154	100.0	582	100.0	1,335	100.0	2,081	100.0
Fecal Specimens Examined	2,210		2,875		6,472		11,557	
Per cent Positive	7.0		20.2		20.6		18.0	

early stages of the infection. These disappeared as the individual recovered, or more usually a few days thereafter. The detailed findings in this relatively large outbreak of "Newcastle dysentery" are presented separately.[12]

From cases of endemic diarrheal disease in Manhattan, Flexner and Sonne strains have been isolated without difficulty, though in small numbers, but up to the end of September we found only one endemic infection due to the "Newcastle dysentery bacillus." Likewise in the study of endemic diarrhea in a large state institution, Flexner organisms were found with regularity and ease, but Sonne or "Newcastle" infections have as yet not been identified by us. The relative incidence of infections with the "Newcastle dysentery bacillus" in New York City appears to be lower than in the South or the Southwest.

The organisms which we have classified as "Newcastle" conform in all but four instances to the non-gas producing mannitol fermenting strains described by Boyd [4] as his "type 88." Thus they have the same cultural characteristics as the Flexner variety on the sugars commonly employed except for the late fermentation of dulcitol. We have, however, 4 isolations from 2 cases of the gas-producing mannitol fermenting variety. Serologically there was no apparent difference between those strains which produced gas and those which did not. All were agglutinated to titer by the same anti-Newcastle serum, prepared by the use of the gas-producing type-strain from the Standards Laboratory, Oxford, England. Using either the polyvalent diagnostic Flexner serum or the 5 type-specific sera, the Newcastle organisms were agglutinated in low dilutions only. Our polyvalent Flexner serum, for example, agglutinated the type-strains in dilutions of 1:6400, but this would not often give complete agglutination of the "Newcastle" strains above a 1:200 dilution.

We performed only a few tests on patients' sera in New Mexico. In the New York epidemic cases the sera of those who had been ill commonly agglutinated the Newcastle organisms in diagnostically significant dilutions but complete agglutination in 1:320 or above was not observed.

Clinically there has been no marked difference in the character of the cases which yielded one or the other of these 3 varieties of organisms. All degrees of severity and a wide variation in symptomatology have been noted for each type of infection. However, it is our impression that a detailed clinical analysis of an adequate series of cases will reveal significant variations in symptomatology, duration, and outcome, but from the observation of individual cases in the field, no reliable opinion could be formed as to the probable variety of organisms involved. In "Newcastle" infections, we have observed several very severe illnesses with some fatalities in children, but have never encountered the high fatality noted in the English and South American cases. However, even in the same household or epidemic, there have occurred, concurrently with severe infections, other positive cases with only a slight watery diarrhea and little or no general disturbance.

The epidemiological observations for the 3 varieties of infection reveal notable similarities. For all, carriers were not uncommon, multiple cases in the same family frequently occurred, and in the study of isolated groups or communities there was found some prevailing type of organism while the others were identified infrequently or not at all. Among the general population all 3 varieties tended to thrive under similar unhygienic environmental conditions. Possible and unconfirmed differences

concern chiefly the relative incidence and duration of the carrier state.

Identification of the "Newcastle dysentery bacillus" enabled us to transfer a substantial number of supposedly "atypical" organisms to an accepted group with known cultural characteristics and constant serological reactions. This simplified our laboratory procedures and, equally important to us, eliminated the annoyance engendered by an apparently pathogenic but unclassified group of organisms.

CLASSIFICATION AND NOMENCLATURE

Boyd[13] has recently recommended that the Flexner group be expanded to include the additional serological varieties recognized by him in India and the antigenically homogeneous but culturally differing "Newcastle" organisms. He recognizes that there can be legitimate differences of opinion as regards inclusion of the latter. In practical work, we have found it desirable to handle the "Newcastle dysentery bacillus" as an additional type of *Shigella dysenteriae*. It is our recommendation that, temporarily at least, it be so regarded, and that public health and clinical laboratories be prepared to identify accurately both the gas producing and non-gas producing strains of this recently described pathogen.

SUMMARY

The "Newcastle dysentery bacillus" has been found to be the cause of acute diarrheal disease in England, India, Africa, South America, and in three regions of the United States.

The cultural characteristics of this organism are described and the clinical and epidemiological findings compared with those for Flexner and Sonne infections.

The advantages of accurately identifying this organism are emphasized.

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Studies of the Toxicity of Basic Fuchsin for Certain Bacteria*

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THE growing practice of using dyes in media for their selective bacteriostatic powers has emphasized the necessity for having batches of dye of comparable toxicity.† With the inclusion of fuchsin lactose broth in *Standard Methods of Water Analysis* [1] as an alternative method of confirmation, basic fuchsin was added to the list of dyes to be checked for bacteriostatic power. Samples of each new batch of this dye submitted to the Commission on Standardization of Biological Stains for certification were sent to the writer for testing. After a favorable report on a sample of dye, certification "for use in bacteriological media" was added to the certification of basic fuchsin for its other uses, staining and in Endo medium.

Since 1935, 13 samples of basic fuchsin have been so certified. They fall into two groups as regards their bacteriostatic titer for *Escherichia coli* and *Aerobacter aerogenes*. Information as to their chemical composition and dye content, supplied by Dr. H. J. Conn, Chairman of the Biological Stain Commission, from tests made by the Color Laboratory, shows that these two groups correspond to the composition of each batch of dye. Those dyes predominantly pararosanilin form one group and those predominantly rosanilin form the other group, which have greater bacteriostatic powers. The present study was made to investigate the comparative bacteriostatic titers of the four lower homologs of the magenta series which make up the basic fuchsins, for several different strains of bacteria, and to establish if possible a standard for this dye when it is to be used in media for water analysis.

The dyes known commercially as basic fuchsin are usually a mixture of two or more homologs. They are tri-amino tri-phenylmethanes. As described by Conn [2] in *Biological Stains:*

> The fuchsins may have methyl groups introduced directly onto the benzene rings instead of into the amino groups; and the different fuchsins vary from one another in the number of such methyl groups present. There are four primary compounds theoretically possible, namely, with no methyl group, and with one, two, and three substituent methyl groups, respectively.

These homologs are: pararosanilin or Magenta O, with no methyl group; rosanilin or Magenta I, with 1 methyl group; Magenta II, with 2 methyl groups; and New Fuchsin or Magenta III, with 3 methyl groups. Pararosanilin is most often the chief constituent of the basic fuchsin dyes. Commercial rosanilin is very apt to be a mixture of Magenta O, I, and II. Magenta II,

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† Dr. Edmund K. Kline is the referee for studies on the toxicity of dyes for bacteria. The writer is an associate referee.

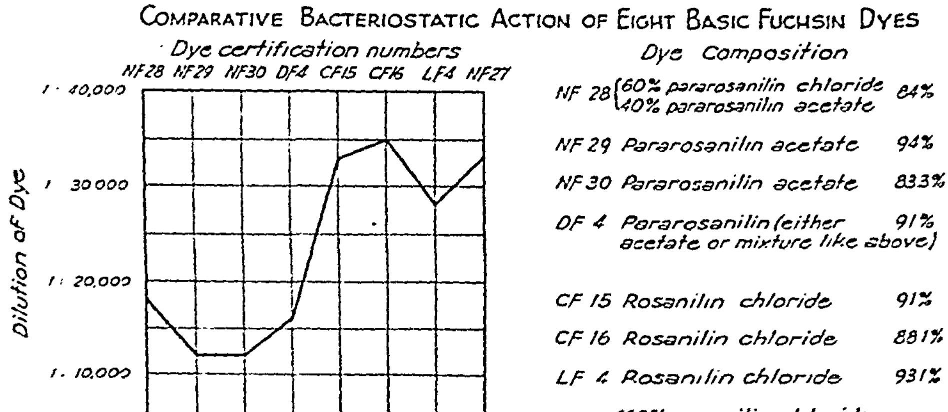
according to Conn,[2] is not encountered pure unless especially prepared. New fuchsin or Magenta III has not been furnished as a biological stain. These basic dyes are used as the chloride or the acetate salts.

Anilin dyes in high concentrations as 1:100 will kill practically all organisms, as pointed out by Kolmer[3] in a review of the literature. When used in lower concentrations, some dyes show bactericidal and bacteriostatic properties for certain organisms, but have no effect on other organisms. This "selective activity" is the basis for much of the use of dyes in bacteriological media. Within a series of dyes, it was observed by Browning and Gilmour[4] that the substitution of alkyl groups increases the bactericidal properties of the dye. This principle is well demonstrated by the series of magenta homologs.

The 6 dyes used in the following experiments were: 2 commercial lots of basic fuchsin, and the chloride salts of the 4 lower basic members of the magenta series. These salts, furnished by the Color Laboratory, were prepared and purified by J. T. Scanlan,[5, 6] and C. G. Melin of the Industrial Farm Products Research Division, Bureau of Agricultural Chemistry and Engineering, U. S. Department of Agriculture, and used by them for experimental purposes. They are designated: pararosanilin chloride (Magenta O), rosanilin chloride (Magenta I), Magenta II, and new fuchsin (Magenta III). Information as to the composition of the commercial dyes was supplied by the Biological Stain Commission. These dyes, identified by their certification numbers, are DF-4, pararosanilin acetate or a mixture of acetate and chloride, dye content 91 per cent; and CF-15, rosanilin chloride, dye content 91 per cent.

The method used in the tests for certification and for the toxicity studies here reported is that of Kline.[7] The

CHART I
COMPARATIVE BACTERIOSTATIC ACTION OF EIGHT BASIC FUCHSIN DYES



Test organism Escherichia coli

Points on the diagram represent the lowest dilution of dye permitting growth

TABLE 1

Comparative Bacteriostatic Action of Basic Fuchsin Dyes
Test organism: Escherichia coli

Designation of Dye / Dilution of dye	*Pararosanilin (Magenta O)*	*DF-4*	*Rosanilin (Magenta I)*	*CF-15*	*Magenta II*	*New Fuchsin (Magenta III)*
1:10,000	+ +	+ +	+ +	+ +	+ +	+ +
1:12,000	— —	+ +	+ +	+ +	+ +	+ +
1:14,000	— —	+ +	+ +	+ +	+ +	+ +
1:16,000	— —	+ +	+ +	+ +	+ +	+ +
1:18,000	— —	+ +	+ +	+ +	+ +	+ +
1:20,000	— —	— —	+ +	+ +	+ +	+ +
1:30,000	— —	— —	+ +	+ +	+ +	+ +
1:32,500	— —	— —	— —	+ +	+ +	+ +
1:35,000	— —	— —	— —	— —	+ +	+ +
1:45,000	— —	— —	— —	— —	+ +	+ +
1:47,500	— —	— —	— —	— —	+ +	+ +
1:50,000	— —	— —	— —	— —	+ +	+ +
1:52,500	— —	— —	— —	— —	— —	+ +
1:55,000	— —	— —	— —	— —	— —	— —

+ Signs indicate bacteriostasis (no growth of bacteria).
— Signs indicate growth. Duplicate columns indicate duplicate tubes.
Tests in lactose-peptone broth pH 6.9; incubation at 37° C. for 48 hours.

bacteriostatic titer of each dye for each test organism was determined. The test medium was 1 per cent peptone, 1 per cent lactose, to which varying amounts of aqueous solutions of the dyes have been added. The organisms were grown until well established in the test medium. For the test, a young culture in the logarithmic phase of growth was so diluted that the amount used for each inoculation contained approximately 100 organisms. Duplicate tubes were made, incubated at 37°C., and examined after 24 and 48 hours for visible growth. Results were recorded in terms of the least concentration of the dye which will inhibit growth.

The 6 dyes tested were set up in parallel series for each organism, thus determining the bacteriostatic titer under the same conditions for each member of the dye series. This is a relative bacteriostatic titer, comparing each dye to each other dye; the results cannot be considered absolute for any specific dye and organism combination. Although each result was checked by more than one experiment, the results given in this paper are from one particular test for each strain of bacteria, of all the dyes.

The 10 organisms for which bacteriostatic titers were thus determined were selected from those which might be found in water. They are:

Gram-negative rods:	*Isolated from*
Escherichia coli	feces
Aerobacter aerogenes	water
Citrobacter	water
A slow lactose-fermenter designated "Hill,"[8] the normal fecal inhabitant of a healthy individual	feces
A slow lactose-fermenter, designated "414" originally thought to be the cause, with streptococcus, of a case of synergism	water
A streptococcus	water
The aerobic spore-forming organisms:	
Bacillus aerosporus	water
Bacillus subtilus (Marburg type) supplied by Kline	contaminated blood agar plate
Bacillus cereus supplied by Kline	water
Cereus-like spore-former, designated "15"	water

TABLE 2

Comparative Bacteriostatic Action of Basic Fuchsin Dyes
Dilution of Dyes Permitting and Inhibiting Growth under Conditions of the Test

(All figures represent duplicate tubes)

Designation of Dye	*Para-rosanilin (Magenta O)*	*DF-4*	*Rosanilin (Magenta I)*	*CF-15*	*Magenta II*	*New Fuchsin (Magenta III)*
Escherichia coli						
Growth	1:12,000	1:20,000	1:32,500	1:35,000	1:50,000	1:55,000
No growth	1:10,000	1:18,000	1:30,000	1:32,500	1:47,500	1:52,500
Aerobacter aerogenes						
Growth	1:5,200	1:6,500 *	1:12,000	1:13,000	1:18,000	1:20,000
No growth	1:5,000	1:6,000	1:11,000	1:12,000	# 1:16,000	1:19,000
Citrobacter						
Growth	1:7,000	1:11,000	1:17,000	1:18,000	1:28,000	1:33,000
No growth	1:6,500	1:10,000	# 1:15,000	# 1:16,000	1:27,000	1:32,000
414 slow lactose-fermenter						
Growth	1:5,500	1:9,000	1:15,000	1:16,000	1:21,000	1:23,000
No growth	1:5,200	# 1:7,000	1:14,000	1:15,000	# 1:19,000	1:22,000
Hill slow lactose-fermenter						
Growth	1:30,000	1:50,000	1:60,000	1:70,000	1:120,000	1:150,000
No growth	1:25,000	1:45,000	1:55,000	1:65,000	1:110,000	1:140,000
Streptococcus						
Growth	1:150,000	1:160,000	1:170,000	1:200,000	1:400,000	1:450,000
No growth	1:140,000	1:150,000	1:160,000	# 1:180,000	1:375,000	1:425,000
Bacillus aerosporus						
Growth	1:110,000	1:160,000	1:160,000	1:180,000	1:300,000	1:380,000
No growth	1:100,000	1:150,000	1:150,000	1:170,000	# 1:260,000	1:360,000
Bacillus subtilis						
Growth	1:300,000	1:350,000	1:400,000	1:450,000	1:600,000	1:800,000
No growth	1:250,000	1:300,000	1:350,000	1:400,000	1:500,000	1:700,000
Bacillus cereus						
Growth	1:300,000	1:500,000	1:900,000	1:1,000,000	1:1,500,000	1:2,250,000
No growth	1:250,000	1:450,000	# 1:700,000	1: 900,000	1:1,250,000	1:2,000,000
15 cereus-like organism						
Growth	1:400,000	1:600,000	1:1,000,000	1:1,200,000	1:1,800,000	1:2,100,000
No growth	1:350,000	1:500,000	1: 900,000	1:1,000,000	# 1:1,600,000	1:2,000,000

* One tube of dilution 1:7,000 showed bacteriostasis.
At an intermediate dilution of the dye, one tube showed bacteriostasis and one showed growth.

The results of the experiments show the difference in susceptibility to dye action of each individual organism, as measured under the conditions of the tests; and they show that the relative titers for each dye homolog bear a relationship similar in order for each organism tested. The detailed results of the test with one of the organisms are given in Table 1. A summary of the results of the series of 10 tests is given in Table 2, which shows the values for the dilutions at which each dye permits or inhibits growth. The stronger bacteriostatic effect of each higher homolog of dye, in turn, is shown for each kind of bacteria. The differences in action are not constant as to amount for the organisms tested, but are constant as to direction. Thus pararosanilin is always the least inhibitory of the series, and new fuchsin the most inhibitory. The two samples of commercial dye act very much as do the samples of the salts of which they are largely composed, exhibiting an inhibitory power greater than that of the pure salts but not so great as that of the next higher homolog. This suggests that the commercial dyes contain small amounts of the higher homologs.

The part that the alkyl group plays in heightening the toxicity of a dye is clearly indicated in this series. The addition of each new methyl group increases the bacteriostatic titer of that homolog for each of the test organisms. The absence of effect from the chloride

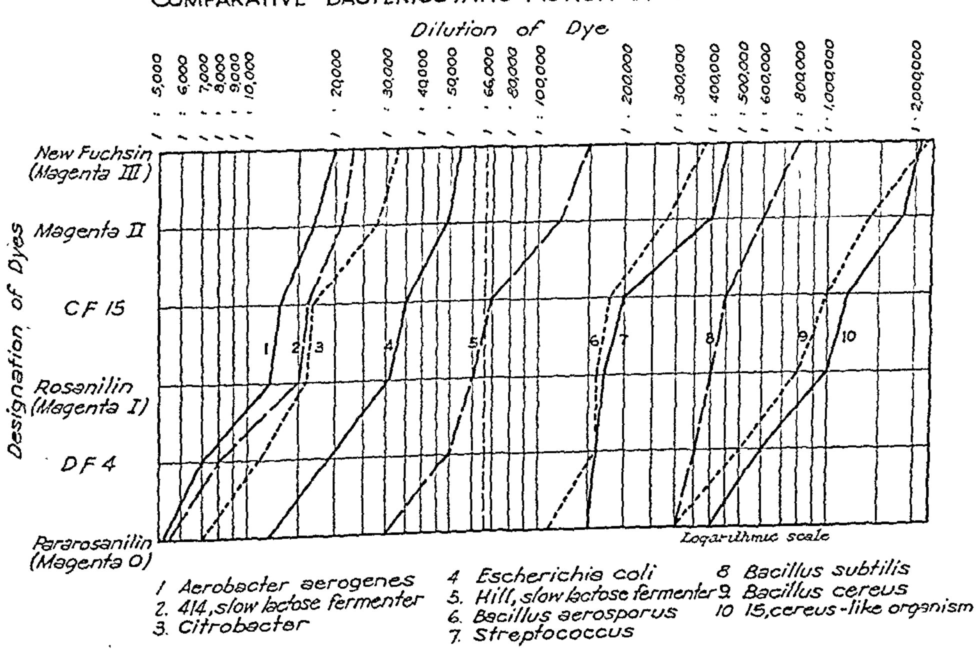
or acetate anion is suggested by results of titrations of commercial batches of dye. In Chart I are given the results of 7 such representative dyes, titrated for bacteriostatic action against *Escherichia coli*. They were compared with dye number CF-15, selected as the standard in tests for certification. The accompanying information as to composition and dye content was furnished by the Color Laboratory.

It will be noticed in Chart I that although there are differences in the titers of the dyes within each group, the difference is not so great as that between the groups of pararosanilin and rosanilin dyes. The lack of correlation between per cent of dye content and bacteriostatic action indicates that these commercial dyes are not pure, but contain small amounts of the higher homologs, as Magenta II.

The selective bacteriostatic power of basic fuchsin for the organisms is evident. The Gram-negative rod forms are inhibited by comparatively low dilutions of the dyes, ranging for pararosanilin from 1:5,000 to 1:25,000. The Gram-positive organisms are inhibited by higher dilutions; for the streptococcus the inhibiting value of pararosanilin is 1:140,000. The spore-producing organisms are the least dye-tolerant, *Bacillus cereus* being inhibited by a 1:250,000 dilution of pararosanilin. Relationships among the different bacteria are suggested by the similarity of some of the bacteriostatic titers, such as those with *Aerobacter aerogenes* and Citrobacter.

Basic fuchsin is incorporated in fuchsin lactose broth in water analysis for its selective bacteriostatic action. The concentration used is 0.0015 per cent or 1:66,000. This concentration of pararosanilin or of rosanilin would have no effect on the members of the coliform group as tested in this study. Magenta II and Magenta III have not been furnished for biological use. The relationships are shown in Chart II in which

CHART II
COMPARATIVE BACTERIOSTATIC ACTION OF BASIC FUCHSIN DYES



Points on the diagram represent the lowest dilution of dye permitting growth

an extra line is drawn at the dye concentration of the present standard of 1:66,000. The Hill strain of slow lactose-fermenting bacteria of fecal origin, is inhibited by the sample of commercial rosanilin. Although it would be desirable to isolate this organism when it is present in water, it must be noted that routine methods of water analysis would not detect its presence. The spore-forming organisms are inhibited by these dyes in dilutions much higher than those used in media. The streptococcus is also inhibited, which in itself might not be desirable, but false positive results in water samples caused by a symbiotic combination having streptococcus as one of the bacteria involved, would not develop. The more recently suggested [9] concentration of dye for fuchsin lactose broth of 0.0025 per cent or 1:40,000 would have a similar effect. It is realized that the medium in which the dye is used is not the same as that in which these tests are made; but the comparative bacteriostatic action of the dyes would not differ.

The amount of basic fuchsin to be used for bacteriostatic action against a certain selected organism should be varied in accordance with the chemical composition of the dye. The difference in inhibitory effect of the homologs may be equalized in many cases by use of a different dye concentration. Numerical values for amounts of these homologs showing the same bacteriostatic power cannot be given because the difference in power between the homologs is not the same for all organisms.

The variations of results within a test set were much the same as those mentioned by Kline.[7] Titrations with most of the organisms were consistent and could be checked. Exceptions were the fecal strains *Escherichia coli* and the Hill slow lactose-fermenter. The results with these organisms were always uniform for the bacteriostatic titers of pararosanilin chloride and DF-4, also a pararosanilin dye. With the other homologs, especially Magenta II and Magenta III, the titers were sometimes so high as to be beyond the range of dilutions used. The results with these two organisms as here reported, were checked by several trials. The occasional variations noted suggest that pararosanilin would be somewhat preferred as a bacteriostatic agent when the isolation of *Escherichia coli* is involved; and that Magenta II and new fuchsin (Magenta III) are unsuitable.

SUMMARY AND CONCLUSIONS

Six dyes which are included in the general term basic fuchsin were tested for bacteriostatic titer against 10 strains of bacteria which might be found in water. These dyes are the homologs pararosanilin or Magenta O; rosanilin or Magenta I; Magenta II; and new fuchsin, or Magenta III; and two commercial dyes, one pararosanilin and one rosanilin.

The results for all organisms bear a relative titer corresponding to the number of methyl groups in the dye radical, the bacteriostatic titer increasing with the larger number of methyl groups.

The two commercial dye samples showed bacteriostatic titers only slightly higher than those of the pure salts of which they are largely composed. This suggests the presence in these dye batches of small amounts of the higher homologs.

The results of tests of a series of commercial samples of basic fuchsin, composed of both acetate and chloride salts, suggest that the anion has small part in determining the bacteriostatic titer.

Basic fuchsin is used in fuchsin lactose broth for water analysis in a concentration of 0.0015 per cent or 1:66,000. This concentration of pararosanilin or of rosanilin would eliminate unwanted spore-forming organisms but not inhibit the coliform group, accord-

ing to the experiments here reported.

Either pararosanilin or rosanilin dyes may be used in fuchsin lactose broth where bacteriostatic action is desired. The pararosanilin dyes are preferable, as the other homologs at times exhibit an erratic inhibitory effect on the *Escherichia coli* members of the coliform group. Magenta II and Magenta III are not suitable.

All samples of basic fuchsin submitted for certification up to this time have been found satisfactory in accordance with the results of these experiments. Tests of new batches of the dye may be made by determining the bacteriostatic titer, in comparison with the titer of the standard dye, for one coliform group organism and one aerobic spore-forming organism.

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The National Plumbing Laboratory*

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THE National Plumbing Laboratory was organized in November, 1938, and has been functioning now for about a year. A year is but a short time for information regarding any institution to be broadcast adequately and correctly through the entire range of any wide extended group of professional men. Doubtless many who are potentially concerned with the work of the Laboratory are as yet unaware of the full nature and extent of the services it is in a position to render them; others may have in their minds certain misapprehensions relative to the exact place which this institution aspires to fill in the field of plumbing. Inevitably, as in any new development, certain initial prejudices must be met and explained away. Such being the case, we believe it fitting at the present time, even at the expense of some repetition, that the more important details regarding the National Plumbing Laboratory should be explained and publicized. That is the purpose of this short paper.

During the last few years various organizations and individuals acquainted with the problem of water pollution due to faulty plumbing fixtures have realized that the elimination and correction of such fixtures must be carried out. This can be done adequately only if there is a neutral, centralized agency to test and report on the hundreds of different fixtures and devices on the market. Because individuals differ in regard to what constitutes a safe fixture so far as water pollution is concerned, various standards are developed in many localities. For example, the hydraulics and pneumatics of the problem of back-siphonage is far too complex and varied to insure that uniform and proper tests will be made in every different testing laboratory established.

In consideration of these facts, the National Association of Master Plumbers, being one of the organizations vitally interested in the whole problem of plumbing and water pollution, promoted the establishment of a group that would serve as an unbiased, national testing and reporting agency for various plumbing fixtures and protective devices. The outcome of this promotional effort was the organization of the National Plumbing Laboratory, which was incorporated as a non-profit organization with a duly constituted board of directors in order that this group might have legal entity. The sole functions of this board are to take care of finances and to appoint the Council.

The Council is the body which has the sole power and function to develop testing methods and standards, to pass on test reports, and to determine whether or not various fixtures or devices are acceptable for listing. It consists of 12

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members, of which 8 must be men interested in public health, but not actively engaged in the manufacture, sale, or installation of plumbing equipment. They receive no pay and have no financial interest in any plumbing fixture or device. As now constituted, the Council consists of the following members:

1. M. W. Cowles, Health Officer, Hackensack Water Company, New Milford, N. J.
2. L. V. Carpenter, Professor of Sanitary Engineering, New York University, New York, N. Y.
3. B. W. Cullen, Superintendent, Water Pipe Extension Division, City of Chicago, Ill.
4. A. J. Farrell, Chief Plumbing Inspector, State of Oregon, Portland, Ore.
5. W. Scott Johnson, Chief Public Health Engineer, State of Missouri, Jefferson City, Mo.
6. V. M. Ehlers, Director, Bureau of Sanitary Engineering, State Board of Health, Austin, Tex.
7. A. R. McGonegal, former Chief Plumbing Inspector, District of Columbia.
8. D. C. Williams, Commissioner of City of Cedar Rapids, Iowa.
9. L. J. Kruse, Master Plumber, Oakland, Calif.
10. John J. Downey, Master Plumber, Boston, Mass.
11. H. L. Hopkins, Master Plumber, Charlotte, N. C.
12. F. P. Moss, Master Plumber, Miami, Fla.

The foregoing group adopted on November 30, 1938, the procedure that would be followed in the testing and accepting for listing of plumbing fixtures and various protective devices. It has the authority to select the testing agency which at present is the Iowa Institute of Hydraulic Research of the State University of Iowa, Iowa City, Iowa.

Any primary manufacturer of water-using plumbing equipment can submit apparatus for test. However, such apparatus or device must be in a form ready for manufacture; it cannot be simply a rough assembly or model. Complete drawings and all advertising and publicity material must be submitted with the device for review by the Council.

After a device has been investigated by the testing agency, a report is submitted to each member of the Council. Each member then votes for or against acceptance of the apparatus. Favorable votes of three-quarters of the members of the Council will permit the device to be placed on an accepted list, which list will be properly publicized. If a device fails of acceptance, its limitations are reported to the manufacturer along with suggestions relative to its improvement. No other publicity is at present given to non-acceptable contrivances.

The many minor details which pertain to the functions of the Council have all been listed in a booklet, *Procedure for the Council*.* Considerable time and effort have been put forth by the Council in adopting the rules under which the National Plumbing Laboratory functions. Interested person unfamiliar with the full purposes and aims of this organization would do well to study this booklet carefully. It sets forth in simple, direct, and exact language the ways and means by which the National Plumbing Laboratory hopes to attain its purposes and goal, namely that of preserving the purity of the water supply by testing plumbing equipment in a scientific and unprejudiced manner.

I have heard comments that the National Plumbing Laboratory duplicates the work of the National Bureau of Standards and that each is at cross-purposes with the other. The National Plumbing Laboratory is an organization which is attempting on a national scale to promote properly designed plumbing fixtures and to eliminate those that are dangerous to the public health. Its services are free to any manufacturer and the information it obtains is avail-

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* This pamphlet may be secured by addressing the Secretary, National Plumbing Laboratory, 917 Fifteenth Street, N. W., Washington, D. C.

able to all plumbing inspectors, boards of health, health officials, etc.

The Bureau of Standards, however, is not concerned directly with the testing of plumbing fixtures and devices except in so far as testing and preparing of standards is necessary in connection with government work. The Bureau tests fixtures and reports on them at the request of a governmental agency and not at the request of some private individual. Many of its reports are of a confidential nature and are not publicly available. The National Plumbing Laboratory and the Bureau of Standards, therefore, do not in any way displace or replace each other's work. In fact, the testing agency of the National Plumbing Laboratory has had close contacts with the Bureau and has interchanged information on test procedures and standards adopted.

The National Plumbing Laboratory can be of great help to plumbing inspectors who do not have the time or financial aid to test plumbing fixtures, in order to determine their functioning as far as possible water pollution is concerned. The opinion of 12 men, such as compose the Council, certainly is more correct and unbiased than the personal opinion of a single inspector. Many inspectors, however, failing to avail themselves of the work of the National Plumbing Laboratory, attempt in their own inadequately equipped laboratories to run tests and set up their individual standards of performance.

During the first year, as was to be expected, the National Plumbing Laboratory received many discouragements, but I personally believe that the reasons for its existence are sufficiently important, and its aims and purposes sufficiently worthy to insure its continued influence and usefulness. The National Plumbing Laboratory can with proper support do much to eliminate on a national scale the use and installation of improper plumbing fixtures and the use of "gadgets" for the prevention of back-siphonage. It can also bring standardization to the back-siphonage problem, thus eliminating the present unsatisfactory situation. Every state and every city seems to have some different regulation in regard to the prevention of back-siphonage from this or that fixture. Certainly the bringing about of some uniform methods of solving this problem should be of importance to the manufacturers of plumbing equipment. This would also assist materially the work of public health engineers and inspectors.

In many respects the future of the National Plumbing Laboratory will depend on the support given to it by members of the American Public Health Association. To this end we believe it would be worth the while of all those concerned with the supplying of pure water to acquaint themselves with the purposes and functions of the National Plumbing Laboratory. It should be borne in mind that the Council members receive no pay and have no financial interest in any plumbing fixture or device. and that no charge is made to the manufacturer for testing any device.

The National Association of Master Plumbers has given this Laboratory an auspicious start and it is now functioning in a satisfactory way. The worthiness of its efforts and purposes has been proved. It should, therefore, receive the present encouragement and support of other organizations and groups interested in keeping water safe from the source to the consumer

Comparative Efficiency of Endo, Lithium Chloride Endo, Desoxycholate-Citrate, and Bismuth Sulfite Media for the Isolation of Eberthella Typhosa*

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THE technical phases of the isolation of the pathogenic bacteria and their subsequent identification present many difficulties. The direct microscopic examination of the specimens by means of stained smears so helpful in cases of many infections, is utterly useless in the isolation of *Eberthella typhosa* from feces specimens because there are no distinctive morphological or tincture characteristics to differentiate *E. typhosa* from the nonpathogens commonly found in feces. Agglutination tests [1] with patient's serum cannot be relied upon as diagnostic evidence of the presence of *E. typhosa* in a locality where large masses of the population have repeatedly been given vaccine, as is the common practice in most of the southern states. The only certain means of establishing the nature of an infection is the isolation of the causative organism.

Many different media and procedures have been devised for the isolation of *E. typhosa*. Almost every bacteriologist has his favorite procedure which seems to be successful in his own hands; consequently he hesitates to accept new methods or modifications of old ones. Probably for this reason Endo medium or some modification of it is still used by a majority of bacteriologists. The addition of 0.5 per cent lithium chloride to the Endo medium proved an effective medium for the isolation of *E. typhosa* in the hands of Havens and Mayfield.[2] The Tennessee Bureau of Laboratories [3] have used this medium with satisfactory results. Wilson and Blair's [4] bismuth sulfite medium is now being used very widely. Sellers, Morris, and Reynolds [5] report the superiority of bismuth sulfite agar over the Endo medium in a comparison of fecal specimens streaked on Endo and bismuth sulfite media. Cope and Kasper [6] in a comparative study of Endo and bismuth sulfite media, favored the use of both media, but found it inadvisable to discontinue the use of Endo agar in favor of any recently developed differential plate medium. Leifson's [7] desoxycholate-citrate agar is recognized by many as an excellent medium for the isolation of *E. typhosa* and *Shigella dysenteriae*.

The study presented in this paper is a report of the comparative efficiency of plain Endo, lithium chloride Endo, desoxycholate-citrate, and bismuth sulfite culture media for the isolation of

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E. typhosa from routine feces specimens received by the Laboratories of the Mississippi State Board of Health. These feces specimens were collected by the county health officers and nurses and not by special investigators. In the tabulations of this study it will be noted that the specimens were classified as to the history; whether or not they were cases, releases, or carriers. This was done in an attempt to determine whether or not any one medium was more efficient in the isolation of *E. typhosa* for any particular group.

LABORATORY PROCEDURES

There is as great a lack of uniformity in procedures used for the collection of material for cultures and identification of bacteria isolated as in the media used for isolation. Feces specimens are collected in a screw top, 1 oz. glass jar containing a 30 per cent solution of glycerine (in 0.85 per cent salt solution) which has been autoclaved at 121°C. for 15 minutes. Instructions for inoculating the glycerine with a small amount of feces (not to exceed 1 gm., about the size of a bean) are given on each bottle. Specimens must be forwarded to the laboratory in order to have them arrive not later than 48 hrs. from the time of collection. Specimens having an excessive amount of feces and those over 48 hrs. old from the time of collection until it reaches the laboratory are marked unsatisfactory and another specimen is requested. Of 15,000 specimens examined in this laboratory less than 5 per cent of these specimens have been unsatisfactory because special emphasis has been placed on this for the past 6 years.

The specimens are inoculated on the media used for isolation the day they are received. These specimens are then placed in a 20°C. refrigerator and inoculations are made on the second and third days. The number of additional positive cultures obtained by inoculating the specimens on the second and third days is shown in the tables that follow in the comparative efficiency of the media. The inoculated plates are incubated at 37°C. for 18 hrs. The plates are then examined and suspicious colonies fished to Russell's double sugar tubes. Cultures giving the characteristic reaction of typhoid on this medium are tested for motility and agglutination by the macroscopic slide method with anti-typhoid and anti-polyvalent dysentery sera. It has been our experience that *E. typhosa* does not cross-agglutinate with anti-polyvalent dysentery serum but that some of our Flexner strains of dysentery bacilli will cross-agglutinate with the anti-typhoid serum. Tube agglutination is done on all dysentery cultures in which cross-agglutination occurs in the macroscopic slide test. Fermentation tests are made routinely using the following carbohydrates: xylose, lactose, dulcitol, mannitol, rhamnose, saccharose, and sorbitol. The basic medium for the carbohydrates is 0.5 per cent semi-solid beef extract agar with 1 per cent Andrade's indicator. The semi-solid agar is tubed in 2 cc. amounts and autoclaved 30 minutes at 121°C. To these tubes are added 0.1 cc. of 20 per cent concentration of the carbohydrates (which are made by weighing the sugars into sterile bottles containing the proper amount of distilled water). These tubes are then sterilized in the Arnold 1 hr., at 100°C., incubated for sterility, and tested with a known culture of *E. typhosa* for typical reactions before being used. Tubes of Simmon's[8] citrate agar and Jordon and Harmon's[9] sodium potassium tartrate agar are also inoculated from the Russell's slant at the time the carbohydrates are inoculated. At the time of inoculating the carbohydrates, citrate, and tartrate, a very small amount of culture on the Russell's slant is emulsified in Difco tryptone broth and restreaked on a plain Endo plate.

If the restreak on plain Endo shows that the culture is not pure, colonies are fished from this plate to Russell's double sugars and again tested in the same manner. The tryptone broth culture, after 24 hours' incubation, is tested for the presence of indol. Motile cultures which agglutinate anti-typhoid serum giving acid with no production of gas in xylose usually, in mannitol, and in sorbitol, acid in the butt of tartrate, no reaction in citrate agar, are considered *E. typhosa*. If a strain is isolated which gives the cultural reactions for typhoid but which does not agglutinate with the anti-typhoid serum, it is sub-cultured daily on a plain agar slant. Usually 6 to 8 such transfers are sufficient to render the culture agglutinable.

COMPARISON OF PLAIN ENDO AND 0.5 PER CENT LITHIUM CHLORIDE ENDO FOR THE ISOLATION OF E. TYPHOSA

Many typhoid bacteria may be present in a specimen of feces which will not appear on the plain Endo plate unless the rapidly developing colonies of the normal fecal bacteria are restrained. The addition of lithium chloride to Endo medium restrains the fecal colonies and permits the appearance of the typhoid colonies.

This comparative study of the advantages of lithium chloride Endo medium and plain Endo medium was made with a large series of specimens of which 477 were positive for *E. typhosa*. Difco Endo medium was used in this series. The 0.5 per cent lithium chloride Endo medium was prepared by adding a sterile 20 per cent concentration of lithium chloride to the Difco Endo medium. The results of this comparison are given in Table 1.

In no instance in this series was the Endo plate positive when the lithium chloride Endo was negative. On the other hand there were 203 specimens which would have been reported negative if only the plain Endo medium had been used. Of the 477 positive specimens for *E. typhosa*, 51 specimens streaked on plain Endo and 71 specimens streaked on lithium chloride Endo would have been reported negative had only one day's plating been done.

Since many laboratories prefer the use of Endo medium prepared in the laboratory in preference to Difco Endo, a comparative study of Difco Endo, with and without the addition of lithium chloride and Endo prepared by the Laboratories of the Mississippi State Board of Health was made. The Endo medium prepared by the laboratory consisted of 10 gm. peptone, 5 gm. beef extract, 30 gm. agar in 1,000 cc. water,

TABLE 1

Comparison of Endo and Lithium Chloride Endo (Difco) Media for the Isolation of E. Typhosa from Feces

477 Positive Specimens

	Endo Medium Repeated Plating			*0.5% Lithium Chloride Endo Repeated Plating*		
History of Specimens	*24 hr.*	*48 hr.*	*72 hr.*	*24 hr.*	*48 hr.*	*72 hr.*
Case	78	19	6	151	15	14
Release	35	3	0	73	10	5
Carrier	110	18	5	182	15	12
Total by Plating	223	40	11	406	40	31
Total Positives			274			477

adjusted to 7.8–8.0 pH measured in 100 cc. amounts, and autoclaved 30 minutes at 121°C. To the base agar was added 1 per cent lactose and 1 cc. of a 10 per cent concentration of sodium sulfite to which 0.5 cc. saturated alcoholic solution of basic fuchsin (3 gm. of basic fuchsin in 100 cc. 95 per cent alcohol) had been added. The formula used in the preparation of Difco Endo's medium by the Difco Laboratories consists of 10 gm. Bacto-Peptone, 10 gm. Bacto-Lactose, 3.5 gm. di-potassium phosphate, 15 gm. Bacto-Agar, 2.5 gm. sodium sulfite, 0.4 gm. of Bacto-Basic Fuchsin (DF-4) in 1,000 cc. of water, with final pH 7.5. Forty-one and one-half gm. of the dehydrated medium is mixed with 1,000 cc. of distilled water and autoclaved 15 minutes at 121°C. The comparison of the two media, with and without lithium chloride, is given in Table 2.

by the laboratory. Plates with spreaders made the isolation of *E. typhosa* difficult in many instances on the laboratory prepared medium. This difficulty was not encountered with the Difco Endo medium. The laboratory prepared Endo plates were overgrown with fecal bacteria in many instances where difficulty was not found in isolating *E. typhosa* from the Difco Endo plates.

Some laboratories use two plates of plain Endo medium for the isolation of *E. typhosa* from feces specimens—streaking the second plate as a continuation of the first plate without re-inoculating the loop. A series of 344 feces specimens were cultured in a study comparing the two plates of plain Difco Endo medium, streaked in the above manner, with one plate of 0.5 per cent lithium chloride Endo medium. Table 3 is a tabulation of this series.

In this series of 344 specimens ex-

TABLE 2

Comparison of Difco (Dehydrated) Endo Medium and Endo Medium Prepared in State Hygienic Laboratory—with and without Lithium Chloride for Isolation of E. Typhosa

348 Specimens—195 Positive Cultures

	Endo Medium State Hygienic Laboratory						*Endo Medium Difco Laboratories*					
	Plain Endo Repeated Plating			*0.5% LiCl Endo Repeated Plating*			*Plain Endo Repeated Plating*			*0.5% LiCl Endo Repeated Plating*		
History of Specimen	*24 hr.*	*48 hr.*	*72 hr.*	*24 hr.*	*48 hr.*	*72 hr.*	*24 hr.*	*48 hr.*	*72 hr.*	*24 hr.*	*48 hr.*	*72 hr.*
Case	14	4	2	17	2	4	18	2	2	31	2	2
Release	5	1	0	6	0	1	6	1	0	14	1	0
Carrier	77	8	4	89	12	4	95	10	9	139	6	0
Total by Plating	96	13	6	112	14	9	119	13	11	184	9	2
Total Positives			115			135			143			195

The Difco Endo medium with 0.5 per cent lithium chloride added was positive in 195 specimens as compare with 143 positive specimens on plain Difco Endo medium. The plain Difco Endo medium yielded 143 positive specimens as compared with 135 positive specimens on lithium chloride Endo medium prepared

amined on two plates of plain Endo and one plate of lithium chloride Endo, 178 specimens were positive for *E. typhosa*. Of the 125 specimens positive on the first plain Endo plate, 6 of these positive specimens were negative on all 3 days' plating on the second plate from the same loop. Of the 142 specimens

TABLE 3

Comparison of One Plate of Lithium Chloride Endo Medium and Two Plates of Plain Endo Medium in Isolation of E. Typhosa from Feces

344 Specimens—178 Positive Specimens

				Media Used								
				Plain Endo								
	Specimens Exam.			*1st Plate from Loop*			*2nd Plate from Loop*			*0.5% LiCl Endo*		
History of Specimens	*Total*	*Neg.*	*Pos.*	*24 hr.*	*48 hr.*	*72 hr.*	*24 hr.*	*48 hr.*	*72 hr.*	*24 hr.*	*48 hr.*	*72 hr.*
Case	38	26	12	6	0	1	7	0	1	9	2	1
Release	89	68	21	7	1	1	10	0	1	14	2	5
Carrier	217	72	145	99	6	4	113	4	6	138	4	3
Positive on 1 plain Endo Plate Only						6			17			
Positive on LiCl Negative on Plain Endo												30
Total	344	166	178			125			142			178

positive on the second plate, 17 of these were negative on all 3 days' plating on the first plate of plain Endo medium. The total number of positive specimens isolated on plain Endo medium, using 2 plates of Endo, was 148. There were 30 specimens positive on the one plate of lithium chloride Endo which were negative on all 3 days' plating on both plates of plain Endo medium. In no instance was the lithium chloride Endo medium negative where either of the plain Endo plates was positive in this comparison. In fact, only twice in a series of over 15,000 feces specimens examined was the plain Endo plate positive when the lithium chloride Endo plate was negative. It will be noted in Table 3 as well as in Tables 1 and 2 that a large number of specimens were positive on the second and third days' streaking which were negative on the first day's streaking. An average of about 25 per cent of the specimens plated were positive on the second and third days' streaking which would have been reported negative if only the first day's streaking had been made.

COMPARISON OF LITHIUM CHLORIDE ENDO, BISMUTH SULFITE, AND DESOXYCHOLATE-CITRATE AGARS FOR THE ISOLATION OF E. TYPHOSA

The lithium chloride Endo and bismuth sulfite agars used in this comparison are the dehydrated media prepared by the Difco Laboratories. The desoxycholate-citrate medium used was prepared by Baltimore Biological Laboratories. The bismuth sulfite and desoxycholate-citrate agars were weighed into flasks containing a given amount of sterile distilled water, melted, and poured. All media were poured 24 hours before the time for them to be used to insure sterility and allow the plates to be free from water of condensation. These plates were kept free from contamination in the cold room and used as long as a week later with satisfactory results. Specimens were streaked on these 3 media for 3 successive days as in the

TABLE 4

Comparison of Lithium Chloride Endo, Desoxycholate-Citrate and Bismuth Sulfite Agars for Isolation of E. Typhosa from Feces

724 Specimens Positive on One or More Media

	Media Used in Isolation								
	0.5% LiCl Endo Repeated Plating			*Desoxycholate-Citrate Repeated Plating*			*Bismuth Sulfite Repeated Plating*		
History of Specimen	*24 hr.*	*48 hr.*	*72 hr.*	*24 hr.*	*48 hr.*	*72 hr.*	*24 hr.*	*48 hr.*	*72 hr.*
Case	165	28	22	190	50	14	143	76	39
Release	75	25	13	70	27	9	63	39	22
Carrier	168	28	11	187	34	10	149	42	28
Total Pos. by Streaking	408	81	46	447	111	33	355	157	89
Total Pos. by Media			535			591			601

other series of comparison. The results of the comparison are given in Table 4.

There were 724 specimens positive on one or more of the 3 media used. Of the 724 positive specimens, 535 (74 per cent) were positive on 0.5 per cent lithium chloride, 591 (82 per cent) on desoxycholate-citrate and 601 (83 per cent) on bismuth sulfite. The additional positives obtained by streaking the specimens the second and third days on these media were 127 positives (24 per cent) on 0.5 per cent lithium chloride Endo, 144 positives (24 per cent) on desoxycholate-citrate, and 246 positives (40 per cent) on bismuth sulfite. Attention is called to the presence of some strains of *E. typhosa* which do not give the characteristic reaction of bismuth sulfite. Nineteen of the 601 positives found on this medium failed to produce typical colonies even after 48 hours' incubation. These strains grew as small colorless or light green colonies on the plates. However, these colonies are characteristic of typhoid growth on other media and should not be overlooked if one does not rely entirely on the production of the black color for typical typhoid colonies. No one medium was found to be positive on all of the 724 specimens. There were 195 specimens which were positive only on one of the 3 media. These results are given in Table 5.

It will be noted that 42 specimens would have been reported negative if lithium chloride Endo medium had *not* been used; 65 specimens if desoxycholate-citrate had not been used; and 88 specimens if bismuth sulfite had not been used. The lithium chloride Endo medium is not so inhibitory as the desoxycholate-citrate and bismuth sulfite media. For this reason some of the specimens were positive on lithium chloride that were sterile for the 3 days on both the desoxycholate-citrate and bismuth sulfite. Likewise the lithium chloride Endo medium was overgrown on some specimens where the desoxycholate-citrate and bismuth sulfite were positive. *B. proteus*, which often spreads over the entire plate on lithium chloride Endo medium is practically inhibited or does not spread on bismuth sulfite.

SUMMARY AND CONCLUSION

The findings in this study indicate that lithium chloride Endo medium is superior to plain Endo (both Difco and that prepared by the Mississippi State

TABLE 5

Specimens Positive on One Medium Only in Comparison of Lithium Chloride Endo, Desoxycholate-Citrate and Bismuth Sulfite Agar for the Isolation of E. Typhosa from Feces

195 Positive Specimens

	Media Used in Isolation								
	0.5% LiCl Endo Repeated Plating			*Desoxycholate-Citrate Repeated Plating*			*Bismuth Sulfite Repeated Plating*		
History of Specimen	*24 hr.*	*48 hr.*	*72 hr.*	*24 hr.*	*48 hr.*	*72 hr.*	*24 hr.*	*48 hr.*	*72 hr.*
Case	12	2	4	21	10	2	16	11	12
Release	10	3	2	7	2	1	7	12	8
Carrier	4	3	2	15	5	2	9	9	4
Total Pos. by Plating	26	8	8	43	17	5	32	32	24
Total Pos. by Media			42			65			88

Laboratories), using either one or two plates of the plain Endo medium.

In a comparison of lithium chloride Endo, desoxycholate-citrate, and bismuth sulfite agars for the isolation of *E. typhosa,* 724 positive cultures were isolated on one or more of the 3 media, with 535 (74 per cent) positives on lithium chloride Endo, 591 (82 per cent) positives on desoxycholate-citrate, and 601 (83 per cent) positives on bismuth sulfite. Of the 724 positive cultures isolated, 195 positive specimens were positive only on one of the 3 media, 42 on lithium chloride, 65 on desoxycholate-citrate, and 88 on bismuth sulfite.

There were 127 specimens (24 per cent) on lithium chloride, 144 (24 per cent) on desoxycholate-citrate, and 246 (40 per cent) on bismuth sulfite which were positive on the second and third days' plating that would have been reported negative if only one day's plating had been made.

No marked difference in the efficiency of lithium chloride, desoxycholate-citrate, and bismuth sulfite in the isolation of *E. typhosa* from specimens examined for diagnosis, release, or carrier has been noted. Bismuth sulfite yielded more positives than lithium chloride or desoxycholate-citrate in the examination of release specimens. Desoxycholate-citrate yielded more positives in the examination of carrier specimens. Both desoxycholate-citrate and bismuth sulfite yielded more positives than lithium chloride in examination of specimens for diagnosis.

Objection may be raised to the use of 3 media for the isolation of *E. typhosa* because of the expense and time required in the use of the media. On the other hand, it has seemed important in this laboratory to continue the use of these 3 media, streaking the specimens 3 days, when the elimination of any one media would mean the missing of 6 per cent on lithium chloride Endo, 9 per cent on desoxycholate-citrate, and 12 per cent on bismuth sulfite.

A great deal of time and expense has been involved by the health officers and nurses in an effort to submit to the laboratory the proper type specimens. Every effort made by the laboratory to render these field workers more efficient results is necessary when the failure to isolate *E. typhosa* from the specimens may result in further spread of the organism from missed cases or carriers.

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Studies on Typhus Vaccine Prepared from Agar-Tissue Culture*

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EVER since the discovery of *Rickettsia prowazeki* as the cause of typhus fever, constant efforts have been made to develop a method of obtaining the organisms in large enough numbers for the preparation of a prophylactic vaccine. Weigl [1] has achieved immunization with a vaccine prepared from the intestinal tract of artificially infected lice in which numerous rickettsiae are found. On the other hand, Zinsser and Castaneda,[2] based upon the observation that heavy accumulation of rickettsiae of murine type occurs in the peritoneal cavity of specially treated white rats, have prepared a vaccine from the peritoneal washings of such animals. Vaccine prepared by these procedures has been shown to give definitely favorable results both in experimental animals and in human practice. However, attempts have been continued to produce a vaccine by the cultural technic, a method which is more easily reproduced, more conveniently handled, and gives more regular results than the one depending entirely on materials obtained directly from infected insects or rats. The concurrent reduction in the expense involved with the use of cultural methods is an additional advantage not to be lightly overlooked especially when a large number of persons are to be immunized.

While Pinkerton and Hass [3] and Nigg and Landsteiner [4] were among the first workers to succeed in cultivating the rickettsiae *in vitro*, it was not until 1934 that Kligler and Ashner [5] first demonstrated the production of immunity in guinea pigs by means of a vaccine prepared from the growth in a modified Maitland culture. Zinsser and Macchiavello [6] have independently arrived at the same conclusion. However, it was soon evident to the latter workers that in spite of the improved cultures contained in large flasks,[7] the yield of rickettsiae was irregular, and frequently disappointing. Zinsser and his coworkers then continued to improve cultural methods with the final evolution of the "agar-tissue" culture.[8, 9] In this medium, the growth of rickettsiae has been found to be regularly and extremely heavy. At the same time, the method is even simpler than the modified Maitland culture. Vaccine has been prepared from the growth removed from agar tissue cultures and has given complete immunity to guinea pigs against large doses of passage virus.[10] Upon such an experimental basis, it seems clear that further study on the use of this vaccine both with experimental animals and in human beings should be carried out. This has been done in Peking, an

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area endemic with typhus fever, with a local strain. The results of such a study, together with a brief description of the method which has been employed for the preparation of the vaccine, form the substance of this communication.

MATERIALS AND METHODS

Strain of typhus rickettsia used—A strain which was originally isolated from the blood of a patient in the Peking area in 1932 by Gajdos and Tchang has been employed.[11] This strain has been maintained by regular passage in guinea pigs and has been used for the production of vaccine by Weigl's method. As this vaccine has been shown to give good practical results,[12] it was chosen for our experiments. This rickettsia produced regular fever in guinea pigs after an incubation period of 6–7 days, showing no scrotal swelling at any time. However, smears made from the tunica exudate have shown from time to time occasional rickettsiae contained in the mononuclear cells. Cultures were easily initiated from the tunica material on both Maitland and agar tissue media.[13]

Method of cultivation—The agar tissue culture method has been used for the growth of the rickettsiae. As a detailed description of this method has recently appeared [10] it is only necessary to mention a few points in which departure from the original method has been taken. A slightly harder agar (2 per cent) containing human serum-Tyrode solution, was employed. This is used to minimize the presence of foreign proteins and obviates the necessity of washing the vaccine. On the 2 per cent agar, it has been found that maximum growth does not occur until the 14th day of incubation, which is much slower than on a softer agar. By grinding the infected tissue thoroughly, it is possible to inoculate sufficient fresh mouse embryonic tissue to make 8 to 12 tubes, and thus it is not difficult to multiply these cultures tenfold with each subsequent generation. However, one of the greatest obstacles to satisfactory use of this method is bacterial contamination, which can only be reduced to less than 10 per cent by persistent efforts and greatest care in details.

Preparation of the vaccine suspension—When the cultures were found to give heavy growth they were used for the preparation of vaccine. In the beginning it was thought that some uniformity in the rickettsia suspension might be obtained if the amount of fluid used to wash down the infected tissue varied according to the degree of growth seen under the microscope. For instance, if a smear from a certain culture should give the appearance of a moderately heavy growth, 1.5 cc. of fluid were used for washing the contents of this tube. On the other hand, if a smear from another tube should give that of a very heavy growth, 2.5 cc. of fluid were used. However, it was soon evident that such an arbitrary standardization based on the examination of one single piece of tissue was apt to give incorrect information. Experience further taught us that it is only possible to tell, by examining a single piece of tissue from each tube, whether that tube is good enough for making vaccine, so it was eventually decided to employ a uniform amount of 2 cc. for each tube until further standardization is possible.

The saline used to suspend the tissue bits contained 1:10,000 merthiolate, which is employed as a preventive against contamination during handling. The contents of 10 or more tubes were then placed in a mechanical glass tissue grinder. This grinder was run for 1 to 2 hours, until few intact cells could be seen, being placed in a bath of cool running water. Phenol was then added to effect a final concentration of 0.5 per cent. The vaccine therefore contains besides the rickettsia, much embryonic tissue, debris, and traces of human

serum. It has two preservatives, phenol at 0.5 per cent and merthiolate in final concentration of 1:10,000. The combination of these two reagents has been recently found by Falk and Aplington [14] to give additional bactericidal power which should kill the rickettsiae sooner than either alone. Before the vaccine was issued for use, sterility test, including inoculation into white mice, was always carried out.

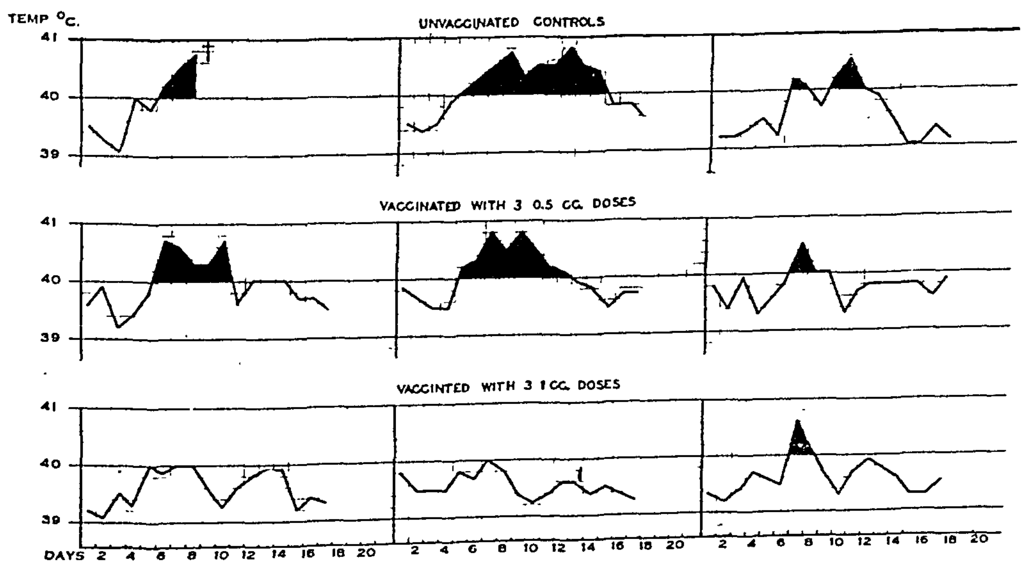
ACTIVE IMMUNIZATION OF VARIOUS LABORATORY ANIMALS AND HUMAN BEINGS

In order to evaluate the effectiveness of the vaccine prepared from tissue culture, rabbits were immunized for the determination of serological response, and guinea pigs for protection tests. The harmlessness of the vaccine was demonstrated on a monkey before use on human volunteers. The results may be presented in the following experiments:

Serological response of rabbits to vaccine—A series of 4 rabbits were given intravenously 3 doses of 1 cc. each at weekly intervals. The Weil-Felix reaction was followed each week. It was found that invariably the rabbit sera showed positive agglutination to *Proteus* X_{19} soon after immunization. Their titer varied from 1:10 to 1:320. However, it is also evident that the highest titer was reached after the 2nd or the 3rd injection; further immunization not only failed to enhance the titer, but also was unsuccessful in maintaining it. Thereafter the *Proteus* antibodies disappeared rapidly in the blood serum of these animals.

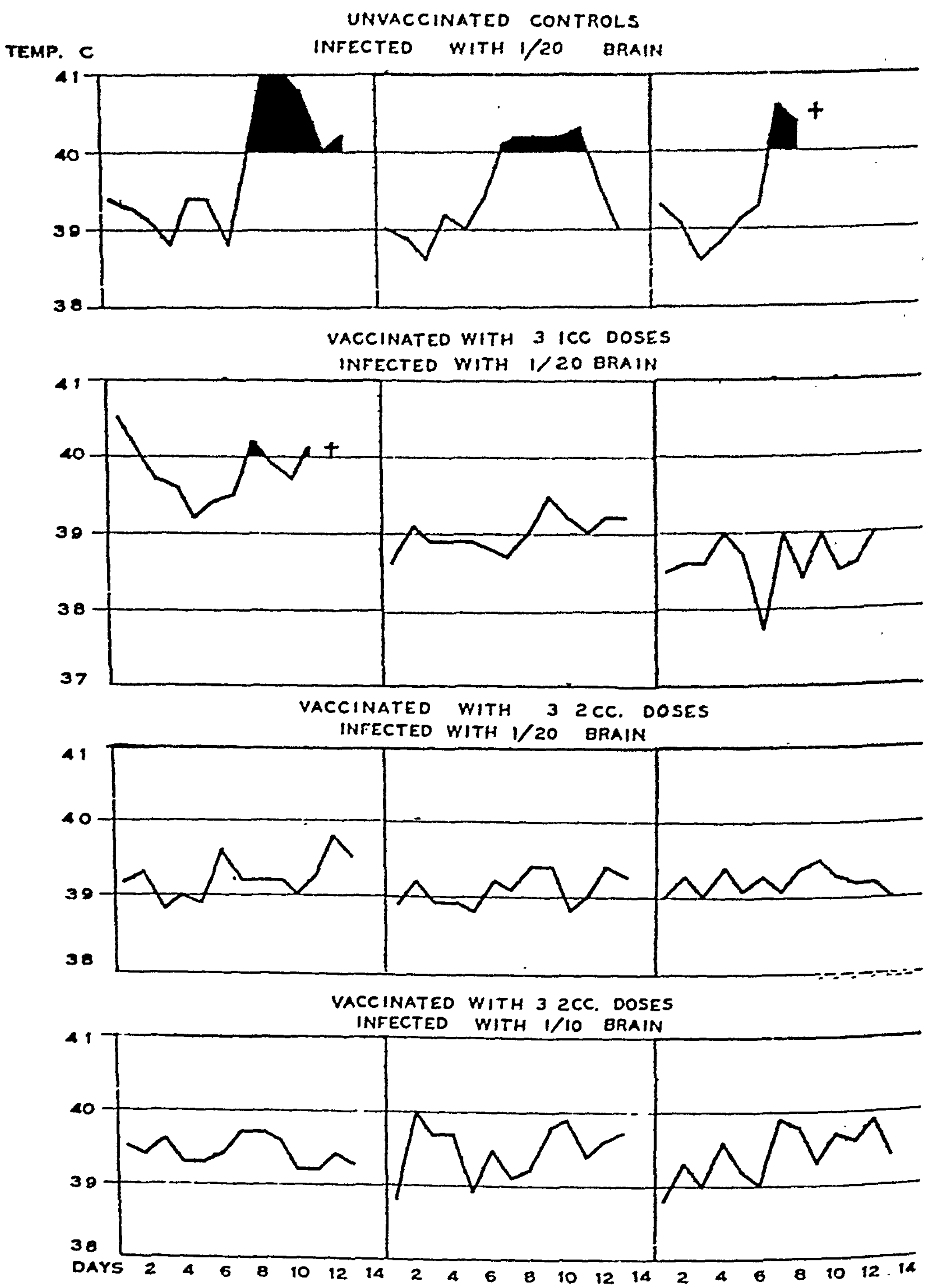
Protection test in guinea pigs—A number of series of guinea pigs was used for this study. Attempt was made to vary the dosage given, and the inoculum used. The method employed follows those generally adopted for studying the protection afforded by vaccine against typhus infection. The vaccine was inoculated subcutaneously, and daily body temperature taken. One week to 10 days after the last injection, an appropriate amount of the inoculum in the form of brain suspension from a passage guinea pig of the homologous type was given intraperitoneally. Daily readings of the body temperature of guinea pigs after such inoculation in one of the several series of animals are presented in Chart 1.

CHART 1—Temperature of control and vaccinated pigs after a large dose of infected material (0.1 of brain)



+ means killed.

CHART 2—Temperature of control and vaccinated pigs after a smaller dose of infected material (0.05 of brain)



+ means killed.

To save space, the temperature after vaccination is not included in the chart, but there was only an occasional animal which showed transient elevation above 40°C. 24 hours after injection, and it never lasted longer than 48 hours. From Chart 1, it is clear that, while 3 doses of 0.5 cc. failed to arouse resist-

ance to the inoculum, 3 1 cc. doses definitely produced some degree of immunity. It is recognized that this protection was not complete, and so a further series with 3 2 cc. doses, and with decreased inoculum has been studied.

It can be seen from Chart 2 that all the controls showed fever following injection of only 1/20 of the brain of a passage guinea pig. After 3 1 cc. doses of vaccine, the guinea pigs were still not completely protected against this reduced inoculum, as one of the 3 showed fever, and positive culture from the *tunica vaginalis*. However, after 3 2 cc. doses of the same vaccine, the guinea pigs were completely protected both against the smaller and against the larger dose of inoculum. This indicates that, given a sufficient amount of vaccine, the animals can be rendered immune to a fairly large dose of typhus rickettsiae.

Reaction of a monkey to vaccination—Before the vaccine was given to human subjects, it was considered of importance to inject at least one monkey in order to find out what local and general reactions the vaccine would cause in an animal of higher order, and to study its serological response. Accordingly, a Macacus monkey was given 3 subcutaneous injections of 1 cc. of vaccine with body temperature taken before inoculation and 24 hours later. It was found that there was only very slight local redness and swelling, and never any fever. One month after the last injection, blood taken for the Weil-Felix reaction showed a titer of 1:40, it being negative before the inoculation. At the same time a small dose of infectious material was injected subcutaneously. Body temperature was then taken daily, and for a period of over 2 weeks; no fever was observed. A guinea pig receiving the same inoculum ran a mild fever indicating that the dose employed was definitely infective for the latter animal. This finding, while far from conclusive, suggests that the animal might have been protected from the dose of typhus material employed. Of greater importance was the fact that the vaccine so prepared was entirely innocuous to the monkey as well as to the smaller laboratory animals, and it seemed safe to use it on human beings.

Immunization of human beings—In view of the absence of any untoward general reaction in the monkey and the

TABLE 1

Subjective and Serological Reaction Following Typhus Vaccination

Name	Previous Vaccination	Post-vaccinal Reaction		Weil-Felix Reaction			
					After Vaccination		
		Local	General	Before Vaccination	1 Month	1½ Months	2 Months
S.P.H.	No	—	—	Negative	Negative		
W.H.C.	"	—	—	"		Negative	
Z.S.H.	Yes	+	—	"	[illegible]		Negative
K.F.Y.	"	—	—	1:80	[illegible]		
L.P.Y.	No	—	—	Negative	[illegible]		[illegible]
T.T.H.	"	—	—	"			[illegible]
L.S.I.	"	—	—	"	[illegible]		
C.F.C.	"	—	—	"	[illegible]		
L.T.P.	"	—	—	"	[illegible]		
W.L.S.	"	—	—	1:10	[illegible]		
P.F.H.	"	—	—	1:10	[illegible]		
C.T.I.	"	—	—	1:10	[illegible]		
C.C.T.	Yes	—	—	1:10	[illegible]		
T.T.W.	No	—	—	1:10	[illegible]		
L.T.H.	"	—	—	1:10		[illegible]	
C.S.I.	"	—	—	1:20	[illegible]		
L.C.W.	"	—	—	1:20	[illegible]		
T.Y.S.	"	—	—	1:20		[illegible]	
S.H.T.	"	—	—	1:45	[illegible]		

definite evidence of protection in several series of guinea pigs, a number of adults volunteered to try out the vaccine. A few of these had received typhus vaccine in various forms but the majority had never received previous immunization. In every case blood was taken for the Weil-Felix reaction before inoculation. The first dose employed was 0.5 cc., the second and the third, 1 cc. given subcutaneously at weekly intervals. Special attention was paid to the presence of local and general reaction. One month after the last injection blood serum was obtained from all individuals and the serological test was repeated. These observations on the effect of typhus vaccine on human subjects are presented in Table 1.

From the table, it seems clear that only slight local and practically no significant general reaction followed the use of this vaccine in all of the human volunteers. In most cases a definite rise in the anti-proteus X_{19} antibody titer was observed. In order to confirm this finding, a larger series of human cases was studied. As before, samples of blood were taken before and after the course of vaccination of 2.5 cc. given subcutaneously at weekly intervals. Thirty-eight additional persons were so studied. A definite increase in their Weil-Felix titer was again noted. Among the total of 57 individuals so studied, 6 showed no change, 23 showed a twofold increase, 20, fourfold, and 9, eightfold increase in the Weil-Felix titer.

Single specimens of blood were obtained from about 100 additional persons some time after the completion of the course of vaccination. These results, together with those presented above, have been compared with a previous series in which the vaccine used was prepared according to Weigl's method in Table 2.

DISCUSSION

The practical value of typhus vaccine has been amply demonstrated by a number of workers both in animal experiment and in human prophylaxis. The Weigl method, which has been extensively practised in certain parts of Europe for protection against the classical type of typhus, has recently been used with particular success in North China.[12] The vaccine prepared with a local strain has protected a large number of Americans and Europeans from succumbing to this fatal disease. However, because of technical reasons, it is necessarily difficult to produce the vaccine in large quantities and at a reasonable price. In view of the successful cultivation of typhus rickettsiae on agar-tissue culture media, an attempt was made to prepare vaccine from these

TABLE 2

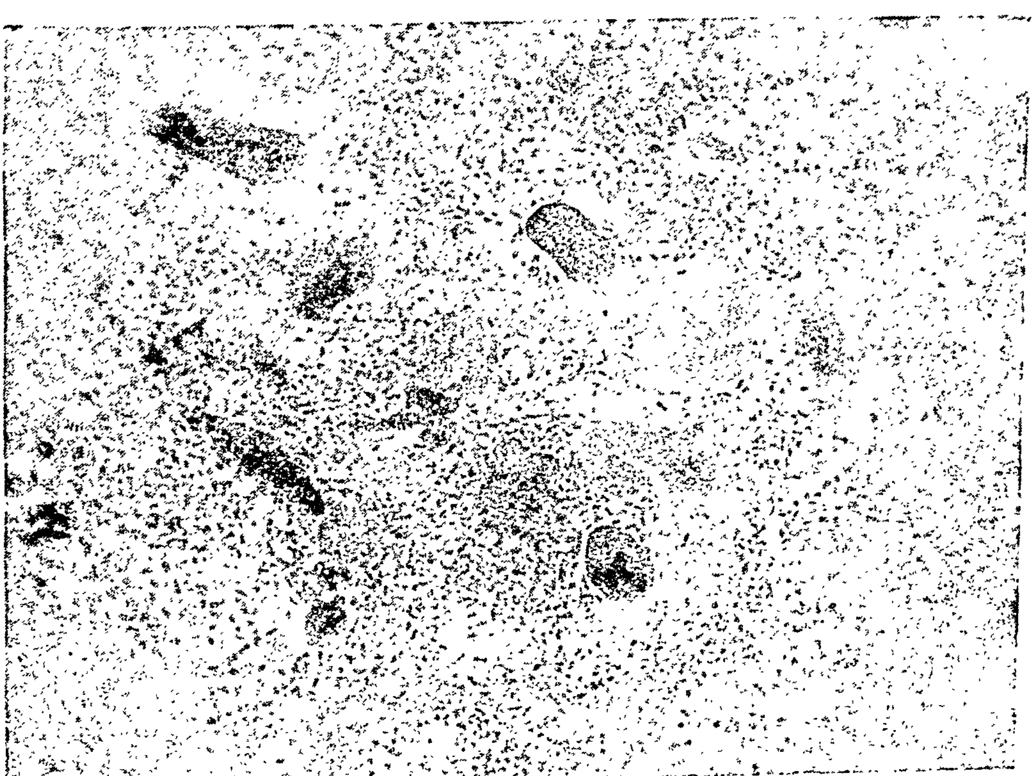
Comparative Weil-Felix Titer After Two Types of Typhus Vaccine

Titer of Proteus X_{19} Antibody	Weigl Vaccine: Number	Weigl Vaccine: Per cent	Cultural Vaccine: Number	Cultural Vaccine: Per cent
<1:10	31	42.2	7	26.8
1:10	23		10	
1:20	49		27	
1:40	67	57.6	47	73.2
1:80	46		40	
1:160	25		23	
1:320	2		8	
1:640	0		2	
Total	243		164	

(Number of Positives in Individuals Vaccinated with)

cultures. It was found that the local strains can be easily isolated and cultivated from the *tunica vaginalis* of infected guinea pigs onto these media, and they have been grown on media containing either horse or human serum. From the first generation sub-cultures have been possible on mouse embryonic tissue with which it has now been carried for more than 25 generations. The vaccines prepared from these cultures have produced positive Weil-Felix reactions in rabbits and human beings, and afford definite evidence of protection in guinea pigs against appropriate doses of infectious material in experimental infection. They were found to produce little or no local and general reaction. However, the dose used was entirely empirical, as no method for the standardization of the vaccine has so far been found. The organisms are of such minute size that direct counting is extremely difficult if not impossible. The opacity standard cannot be employed because of the presence of an uncertain quantity of embryonic tissue. The method is still time consuming and not yet entirely suited for mass production.

The success of human prophylaxis by means of this cultured vaccine cannot be determined at present. It is obvious that a serological test, even one which measures the neutralizing capacity of the serum, does not represent the resistance of the individual.[15] The Weil-Felix reaction has been employed because it is simple and easily carried out, and the resulting data can be compared with those obtained from previous experience in which other types of typhus vaccine have been employed. So far it is evident that the cultural vaccine elicited an almost identical serological response to that obtained with vaccine prepared according to Weigl's method. The vaccine is now being used in individuals who are likely to be exposed to typhus infection, such as residents of Peking and



Rickettsia growing on agar tissue culture

its surrounding districts, and the incidence of the disease among these vaccinated individuals will be noted. For the present, therefore, it is impossible to estimate the practical effectiveness of the vaccine until it is proved in field exposures.

SUMMARY

Typhus vaccine prepared by growing a local strain of typhus rickettsia on agar-tissue culture has been studied. After treatment with merthiolate and phenol, it was found to be entirely non-infectious, but capable of producing positive Weil-Felix reactions in rabbits and in men. Furthermore, if given in sufficient amount, it protected several series of guinea pigs completely against subsequent infection.

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CONFERENCE OF MUNICIPAL PUBLIC HEALTH ENGINEERS

ALTHOUGH most municipal health departments were founded and built on sanitation programs, it has again been brought to our attention by the new organization of Municipal Public Health Engineers, meeting at the time of the American Public Health Association convention in Pittsburgh, that only one-fourth of the 211 cities in the United States of above 50,000 population have trained men directing their sanitation programs. When we add to this the fact that the majority of the inspectors in municipal health departments have had no educational training whatever in public health, it is easy to see that many health administrators need to take time out to examine the foundations upon which their programs are built.

The need for engineers to promote and supervise environmental sanitation activities in the state health departments has long been recognized. Fundamentally the educational and training requirements for municipal public health engineers are the same as for state public health engineers. The administrators of municipal health departments must recognize that control of the environment for the protection and promotion of public health involves engineering principles. This will prove of inestimable value in the development of well rounded health programs.

Planning and promotion, inservice training, research and study are all needed in the development of sound programs, but are not possible without qualified direction. An eight point program giving the aims and purposes of the Conference was outlined. The suggested program includes the use of the organization as a medium for the exchange of ideas. It was pointed out that there is an opportunity to exert a greater influence in all matters affecting the municipal public health engineer.

Two resolutions were passed, one directed to the American Public Health Association and the other to the State and Territorial Health Officers, calling attention to the fact that the problems of controlling the environment involve engineering principles.

The fact that the Health Conservation Contest gives little credit for quality of sanitation activities, but relatively more credit for quantity of work done, and permits health departments without sound sanitation programs to win the contest, was alluded to several times in the discussions.

The public health engineering courses now offered in the schools of today were discussed. The municipal public health engineer requires the same foundational courses as the state public health engineer. These courses are available but not always included in the sanitary engineering options or courses offered. There is need for sound advice and assistance on the part of the faculty in working out suitable complete courses. The required preparation cannot be acquired in 4 years of study, but requires 5 or 6 years.

The need for incorporating the public health viewpoint into all matters of planning, including housing, zoning, water supplies, disaster relief, drainage systems, sewerage systems, etc., is evident. Unless this viewpoint is considered, the health department program often becomes a negative correctional code rather than an intelligently planned, positive type of program.

It is felt that there is a place for such an organization as this in the development of the public health program of the country, and it is expected that from this small beginning it will grow to be an influence in the field of municipal public health engineering comparable to the influence that the Conference of State Sanitary Engineers has exerted in its field.

THE FIRST FIFTY YEARS OF THE MASSACHUSETTS PUBLIC HEALTH ASSOCIATION, 1890–1940

ON January 11, 1890, thirty-five men representing the Massachusetts State Board of Health and twenty-four local boards of health, met in Boston and organized the Massachusetts Association of Boards of Health. Dr. Henry P. Walcott,* who served as the distinguished Chairman of the State Board of Health for twenty-five years, was elected the first President, and Dr. Samuel H. Durgin,* the Chairman of the Boston Board of Health, First Vice-President of the Association.

The Golden Anniversary of this pioneer unofficial state health organization, to be held January 27, 1940, has more than local interest. Massachusetts has made many significant contributions to public health administration and science, and has given to the profession many leaders. The establishment of the Boston Board of Health in 1799, of which Paul Revere was Chairman, was one of the first official health organizations. The famous "Report of the Massachusetts Sanitary Commission, 1850," by Lemuel Shattuck, stands as a great landmark in the history of public health in America. The registration of births, marriages, and deaths in 1842, made effective by this same leader, gave this state some of the earliest reliable vital statistics in the United States. The appointment of the Massachusetts Drainage Commission (1886), consisting of such well known men as William T. Sedgwick, Hiram F. Mills, Thomas M. Drown, and Edwin O. Jordan, and their extraordinary contribution to problems of sewage disposal and water purification; the establishment of the first state antitoxin laboratory (1895), with Theobald Smith, Director; the first state tuberculosis hospital authorized (1895); and more recently the official organized attack on cancer, leading to the formation of a division of adult hygiene in the state department (1929); and

* See also page 88 for brief sketch of life and work.

the pneumonia control program (1931), are a few of the outstanding contributions made by this old state. No less than six former, or present members of the Massachusetts Association have been presidents of the American Public Health Association: Walcott, Durgin, Sedgwick, Chapin, Swartz, and Winslow.

The date of organization, 1890, marks an epoch in the history of sanitary science and preventive medicine. It may have been the consciousness of the advent of a new era that drew these men together. The time had come for collective thinking and collective action. Sanitary laws were in need of extension, improvement, and better enforcement.

The decade preceding had seen the fruition of the science of bacteriology. Bacteria had been demonstrated to be the specific cause of a number of the most important epidemic diseases. The first light had been shed upon the nature of diphtheria toxin, followed shortly by the discovery of antitoxin, thus opening up an enormous and new field of preventive medicine. Sanitary bacteriology was becoming a distinct branch of this new science, thanks largely to the work of the Sanitary Commission mentioned. Engineering and medicine were beginning their combined attack on man's age old pestilences.

We may pause briefly to view the benefits as revealed in the vital statistics of Massachusetts.

	1890 [1]	*1938* [2]
Death rate per 1,000 population	19.44	11.2
Birth rate per 1,000 population	25.81	13.8
Tuberculosis death rate per 100.000 population	259.0	38.6
Typhoid death rate per 100,000 population	37.0	0.3
Diphtheria death rate per 100,000 population	73.0	0.5
Cholera Infantum death rate per 100,000 population	111.0	2.8 *

* Diarrhea and enteritis (under 2 years)

Comparisons like the above have become commonplace, and are accepted casually, but they are a measure of the most significant achievements in all human history. Millions now live who would have died in infancy and childhood. The dread of diphtheria has been removed; the pain and suffering of the fever-wracked typhoid patient is rare; the "bloody diarrheas of infancy" are a thing of the past; the wasting "consumption" is in retreat.

"Each important forward step in public health during the past fifty years in Massachusetts has gained impetus through the meetings of the Association." [3] The meetings from the beginning have dealt with live, contemporary problems. Boards of health in the nineties were poorly staffed, and their activities were very limited. It is not difficult to imagine the leadership and inspiration radiated by such men as Charles V. Chapin and William T. Sedgwick, members of the organization in its early history, who frequently made contributions. Sedgwick's championship of clean milk and pasteurization stands out in the records. From the earliest meetings down to the present, diphtheria and its control hold an important place. Chapin's bold stand on fumigation, nuisances, and the importance of contact infection are conspicuous.

In January, 1901, the first issue of the *Journal of the Massachusetts Association of Boards of Health* was published. This daring undertaking by a local organization of less than one hundred members showed not only courage, but faith. They were justified, for this *Journal* was the parent of the present *American Journal of Public Health*.

In 1904 the title was changed to "American Journal of Public Hygiene and Journal of the Massachusetts Association of Boards of Health"; and in 1910 it was "American Journal of Public Hygiene, Official Organ of the Massachusetts Association of Boards of Health and American Public Health Association." The next year, 1911, the name of the Massachusetts Association was no longer on the title page, and it was "The Journal of the American Public Health Association."[3]

In 1933 the Association was reorganized, chiefly to provide for the expanding professional interests in the public health field. A Health Officers' Section, a Laboratory Section, and a Child Hygiene Section were created. In 1936 the name was changed to "Massachusetts Public Health Association," reflecting more correctly its nature, and its broadening activities and interests.

The relationships of this state society with the American Public Health Association have been long and intimate. Although Massachusetts was not the first state association formally to affiliate with the larger body, it may rightly be said that no other state group among the twenty-one now affiliated has had a more vital or a more conspicuous part in the American Public Health Association. Here is proof, if proof were needed, that these state societies may contribute not only to public health in their respective areas, but to the understanding and fellowship between workers in the manifold fields of health service represented in the larger body and to the advancement of that great cause of the public health.

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HENRY PICKERING WALCOTT AND SAMUEL HOLMES DURGIN

THE following sketches of the lives and work of the early leaders of the Massachusetts Association of Boards of Health have been compiled in connection with the fiftieth anniversary of that association's founding by its present President, Professor Curtis M. Hilliard:

"DR. HENRY PICKERING WALCOTT, Sanitary Statesman, leader in public health, for twenty-eight years Chairman of the State Board of Health of Massachusetts"—thus does Dr. George C. Whipple salute Dr. Walcott in his notable book, *State Sanitation.* Dr. Walcott was born at Hopkinton, Mass., December 23, 1838. He was graduated from Harvard College in 1858, and received his medical degree from Bowdoin College in 1861. After extensive travel and study in Europe he began the practice of medicine in Cambridge.

His first public service was with the Cambridge Board of Health of which he was made a member in 1878. In 1880, he was appointed health officer to the State Board of Health, Lunacy, and Charity. When this Board was reorganized in 1886, Dr. Walcott was elected Chairman, and he held that position until the State Department of Public Health was organized in 1914.

Dr. Walcott held many honored and

important positions throughout his life. Among other positions he was a member of the Board of Overseers of Harvard College, Chairman of the Board of Trustees of the Massachusetts General Hospital, President of the Massachusetts Medical Society, and in 1886 was President of the American Public Health Association. He was one of the founders of the Massachusetts Association of Boards of Health and served as President from its inception in 1890 to 1913. In all these positions he gave distinguished and dynamic leadership. As a presiding officer he had a graciousness and dignity that commanded immediate respect.

His active life was spent during those more thrilling and pioneering years of the development of modern sanitation and preventive medicine. He surrounded himself with able leaders, who, under his administration in the manifold fields indicated, advanced the knowledge and application of the principles of bacteriology, sanitary science, and medicine to a degree that made Massachusetts one of the great leaders in these spheres.

SAMUEL HOLMES DURGIN was born in Parsonsfield, Me., in 1839, the youngest of twelve children. He was graduated from Dartmouth College, and received his medical degree from Harvard in 1864. He served as an assistant surgeon in the last year of the Civil War. When he was mustered out he entered practice in the City of Boston. In 1867, he first entered public service for the City of Boston, and in 1873, at the time the health work in the city was reorganized, he assumed the chief administrative duties. In 1877, he was elected Chairman of the Board of Health, a position which he held until his retirement in 1912.

Throughout his public service Dr. Durgin was alert to take advantage of new discoveries and ideas. As early as 1894, he commenced the manufacture of diphtheria antitoxin. In this same year at the height of an outbreak of diphtheria in the City, he inaugurated the first medical inspection of school children which evolved into the modern program of the general medical inspection and health supervision of school children. He was the prime mover in establishing one of the first city bacteriological diagnostic laboratories in Boston in 1898.

In 1890, he was one of the active persons in forming the Massachusetts Association of Boards of Health and served as its First Vice-President for twenty years. In this capacity he acted also as Chairman of the Publication Committee and was thus responsible for the quarterly journal of the Association, which was the forerunner of the present *American Journal of Public Health.*

Dr. Durgin is described as a prodigious worker. Though a leader, still he was always gentle, unselfish, and deliberate. He was always a friendly and congenial companion, helpful and sympathetic with his subordinates but with an iron will to do the right as he saw it.

The Annual Year Book will be a supplement to the February Journal

BOOKS AND REPORTS

District Health Development: Department of Health, City of New York, Building Program as Related to the Master Plan for the City of New York—*By John L. Rice, M.D., Commissioner. New York: Neighborhood Health Development, Inc. New York City Department of Health,* 125 *Worth St.,* 1939. 53 pp. Price, $1.00.

In addition to giving an account of the striking progress of the building program with constructive future plans, and a brief description of district health administration in New York City, this volume indicates the wisdom of systematic planning of health programs coupled with the value of joint participation of a strong, representative advisory and supporting group in effective relationship with the official organization. Even though this development is on a larger scale than has been planned or realized elsewhere, the technic of study, planning, and presentation of data here revealed offers many helpful and stimulating suggestions to public health administrators.

Following a frontispiece in color which gives a composite picture of the building program, a table of contents, and a photograph of health department headquarters completed in 1935, the Commissioner of Health gives a description of health planning for the future, including a description of the functions of different bureaus. A map of the city divided into districts shows the location of 125 departmental services including health center buildings, substations, and child health stations. Then follows a description of district health administration by the bureau director, with discussion of (a) the health and teaching center program, in which the medical schools participate, and (b) the opportunity for citizen coöperaton.

Over one thousand leaders and citizens are now taking an active part in committee work in five of the thirty health center districts. This ever-growing body of citizens, including clergymen, bankers, labor representatives, educators, industrialists, parents, doctors, dentists, teachers, and other public-spirited individuals, is enthusiastically at work with the health officers, supervising nurses, and staff members of the Department of Health. These groups and individuals are interpreting the idea of district health administration to their respective communities, taking an active interest and part in every phase of the local health program, and developing close working relationships with community groups and agencies.

This important phase of the district health plan is being carried on through the Committee on Neighborhood Health Development and other voluntary agencies which are closely allied to the Department in the regional program.

This publication is arranged as a loose-leaf document, is well illustrated with maps, building diagrams, work charts, and photographs, and is an impressive report on a phase of public health administration of growing significance. IRA V. HISCOCK

Medicolegal Phases of Occupational Diseases—*By C. O. Sappington, A.B., M.D., Dr.P.H. Chicago: Industrial Health Book Company,* 1939. 405 pp. Price, $2.75.

The control of occupational diseases involves the industries concerned, the insurance companies who underwrite the risks, the medical profession which treats and sometimes tries to prevent the hazards, and, most of all, it involves the Law.

Each of these important factors, with its many ramifications and interrelationships, is discussed in each of the 4 parts of this book, with the emphasis placed upon the medicolegal aspects rather than upon the purely scientific, medical, or sanitary phases of the problem.

As a concise and authoritative statement, based on the experience of an expert in the field, this book should be of value to persons in different professional categories who are concerned with the medical, administrative, or legal aspects of occupational diseases. The legal section would have been enhanced, however, if an attempt had been made to present authoritative statements of the legal principles applicable to the problem, as indicated by the consensus of judicial opinion. Abstracts of selected court decisions handed down during 1936 and 1937 are given in one chapter, but the reader is left to make his own deductions from them, a strain on both the lay and legal minds.

A number of appendices give useful abstracts of state legislation, schedules of diseases, more abstracts of legal decisions, and suggestions for legislation. The book is well documented, has a comprehensive index, and a table of cases. It is, on the whole, a valuable contribution to the subject, especially for physicians and public health officials. JAMES A. TOBEY

The Field Unit in Local Public Health Service: Tennessee and Mississippi, 1930–37—*By Harry E. Handley. New York: Commonwealth Fund,* 1938. 50 pp. Price, $.25.

Dr. Handley has presented an exceedingly interesting, accurate, and practical description of the way in which consultant service for local health departments is provided through a trained and experienced field staff of medical, nursing, sanitarian, clerical, and other workers. The relationship of these workers to the local health departments is worthy of further emphasis: first, assignments are made only upon request or with approval of the responsible administrative local official—the full-time local health officer or health department director—the local health officer never loses his identity; second, the field staff members are subject to local health department regulations such as work hours, leave, etc., upon arrival at a particular local health department; third, a report of findings and suggestions for improvement of administrative and technical services is made to and discussed with the local health officer and other local staff members as indicated before the field unit worker departs from the area, therefore, the final written report to the local health officer is an expression of group opinion with due consideration being given all local factors; and, fourth, all members of the field unit staff have had successful local field experience and have demonstrated their ability to teach others prior to employment. The need for expert consultant assistance is apparent since few local governments are able to provide highly trained technical assistants on a full-time basis. Many interesting and worth while accomplishments are outlined to illustrate the practical way in which these staffs function.

The author, in drawing from personal field experience and direct contact with these field services over a period of years presents a challenge that all responsible executive officers of state health departments cannot ignore in planning for an improved quality and quantity of public service within their respective states.

W. C. WILLIAMS

Public Water Supplies in Virginia: Descriptions and Chemical Analyses—*Richmond, Va.: Virginia Department of Health,* 1939. 159 pp.

Following a statement of the laws pertaining to the public water supplies in Virginia, this publication sets forth brief but adequate descriptions of all those supplies. Of interest and value also are the results of chemical analyses of many Virginia water supplies. It is significant to note that 40.5 per cent of the population of this state is furnished with artificially purified water for drinking.

ARTHUR P. MILLER

The Story of Surgery—*By Harvey Graham. With a foreword by Oliver St. John Gogarty. New York: Doubleday, Doran*, 1939. 425 pp. Price, $3.75.

The author says of this unusually interesting book that it is a story and not a historical treatise, intended for "ordinary men and women, as distinct from that nebulous and rather awe-inspiring creature the intelligent layman." He thinks that it may perpetuate some mistakes but they are so venerable that only the irreverent would want to see them corrected. Where medical historians disagree on the interpretation of some manuscript he has accepted the one which pleased him most.

The book opens with a thrilling description of the first operation for falling sickness some half million years ago. The surgeon had for knives only flints which had been sharpened by striking together. From this beginning we have the story of surgery with its advances and occasional retreats up to the present day with its marvelous successes. From such a wealth of material it is difficult to select the salient features without seeming to neglect others, and it must never be forgotten that little things have come into the building of the great structure as well as those which have attracted world-wide attention. When the boiling oil and treacle were exhausted and Paré used a simple mixture of yolk of eggs and turpentine on gunshot wounds a great step forward was made.

The author gives us the story of the controversies between the barbers, the surgeons, the barber-surgeons, and the physicians—with the final emergence of the surgeons into their place of deserved recognition when "surgeons became gentlemen."

Interesting as the general story of surgery is, many readers will be more attracted by the personal histories of men who took part in bringing order out of chaos. Even the profession knows too little of the past and we are often tempted to quote Osler: ". . . it is a sign of a dry age when the great men of the past are held in light esteem."

From the long list of those who have faced the light and done good things as well as great things we can only select a few: Ambroise Paré, Guy de Chauliac, Henri de Mondeville, the "Three Englishmen"—John of Gaddesden, John of Arderne and John of Mirfield, William and John Hunter, Astley Cooper, "the best known surgeon in London at a time when London was the greatest surgical center in the world," a distinction which Paris had held under Ambroise Paré for a century, the Bells, Paget, McDowell, Sims, Syme, Simpson, and Lister, of whom it has been said that there are only two periods in the history of surgery—before Lister and after Lister. Harvey enters the picture, for although not a surgeon, his discoveries "have been at the base of every advance in medicine and surgery." Needless to say, Pasteur takes a prominent part in the story, since in spite of the learning and skill of the surgeons, they had about reached the peak of the possibilities of their art prior to two great events,—the discovery of anesthesia and the work of Pasteur, applied by Lister.

The book is filled with human in-

terest and the author has pointed out how little change has taken place in human nature during the long years of which he writes. A chapter devoted to "The Quacks and the Brothers" gives some well known stories and brings out a most unpleasant characteristic of human nature which is always distressing to those who are advancing science. William Read, a tailor who could not read, was knighted for "curing great numbers of seamen and soldiers of blindness," and became Oculist-in-Ordinary to Queen Anne. John Taylor, whose career Dr. Johnson described as a "striking example of how far impudence could carry ignorance" was given a royal appointment by George II, while his grandson became oculist to both Georges III and IV. Johanna Stephens, who in 1736 claimed a cure for stone in the bladder, derived a large income from peers, dukes, bishops, and merchants, and finally sold her famous secret for 5,000 pounds, raised largely by public subscription. Among the subscribers, many of whom were found in Burke's Peerage, was the Bishop of Oxford. Even the noted Sir Robert Walpole, "an otherwise intelligent Prime Minister" consumed in a few years 180 pounds of soap and 1,200 gallons of lime-water prescribed by a quack to cure vesical calculi, which nevertheless proved fatal. Another human trait is exemplified in the quotation from John of Mirfield (1380):

> "When Physick's dearly bought, it doth much healing bring,
> But when 'tis freely given, 'tis ne'er a useful thing."

The Black Death comes in for mention. In the autumn of 1347 the City of Caffa was besieged by the Tartars. The invading army became infected and was practically wiped out of existence by the plague but before the end they catapulted into the city the corpses of men who had died of Black Death, so within a few days the last of the besieged had died as horribly as had the last of the besiegers. This is the first recorded incidence of bacterial warfare, about which we have heard so much, even within the present year.

Spencer once compared scientific men to children walking on the seashore picking up pebbles. Every once in a while one child will pick up a better polished or a brighter stone than the others. Many instances illustrating this occur. Henri de Mondeville (1260–1320) taught that wounds should be washed clean and left alone. He said, "Many more surgeons know how to cause suppuration than how to heal a wound. Keep your needles sharp and clean or they will infect the wound."

The author credits Morton with the introduction of ether anesthesia, though later on he says, "Actually Dr. Long of Athens, in Georgia, was the first man to use ether as an anaesthetic"—1842. He has apparently lost sight of the fact, pointed out repeatedly, that the famous surgeons of Boston who pushed its use were responsible for its prompt adoption.

The last two chapters deserve special mention. "Today and Tomorrow" sums up the story as we know it today. "The Future" is a forecast which the author introduces with an illustration of the danger of prophecy, quoting Lord Moynihan, who said only about 5 years ago, "The craft of surgery has in truth nearly reached its limit in respect both of range and of safety."

The last chapter, "The Future," ends on a note of optimism for everyone except the surgeon. The surgery of old age will persist and there may be tampering with surgery of the new-born, "removing a gene here and implanting another there." However, the students of our internal economy, "our endocrine glands and the autonomic nervous system," will have done even greater things than at present. They will emerge

from their laboratories and tell the surgeons to drop their scalpels. "Surgery is still that science which deals with the failures of medicine or preventive medicine. One day complete success will be recorded by the workers in these two great fields, and at that moment the surgeon must needs say 'Vale!'"

The book has an excellent bibliography, though the author makes no pretense of its being complete and largely on that account says the book is not a historical treatise. There are two good indices, one of names and one of subjects. There are 33 illustrations, all of which are excellent, and many very rare. Altogether, the book is an unusual one, and it is impossible to write about it without becoming enthusiastic.

MAZŸCK P. RAVENEL

Swimming Pool Standards—*By Frederick W. Luehring. New York: Barnes*, 1939. 273 pp. Price, $5.00.

The purpose of this volume is to "provide guiding standards" for those "charged with the responsibility for the planning, construction, and administration of swimming pools in *educational* institutions." After a historical treatment of swimming pools—ancient, medieval, and modern—the author discusses laws, rules and regulations pertaining to them today. Twenty criteria for judging standards are then set up followed by detailed discussion of the suggested standards. A bibliography of 267 references is presented and the references well connected to the discussions of standards.

ARTHUR P. MILLER

South Italian Folkways in Europe and America—*By Phyllis H. Williams. New Haven, Conn.: Yale University Press (Institute of Human Relations)*, 1938. 216 pp. Price, $2.50.

This volume, it is stated, was written for social workers, visiting nurses, and school teachers and physicians who work among people of foreign birth. It gives accurate and sympathetic information concerning the lives and customs of persons now living in this country who migrated from southern Italy. The material is presented in so charming a manner one feels actually transported to one of Italy's picturesque sunny towns. The characteristic atmosphere is brought into the story so well it is easy to imagine oneself going to market or participating in the preparation of a meal—entering sympathetically into the complete daily lives of the people.

The need for such a volume as this has been long realized by the groups for which it was written; such groups need similar volumes describing the manners and customs of the immigrants from several other countries. It is to be hoped that they will be written.

A. P. HITCHENS

Your Community: Its Provision for Health, Education, Safety, Welfare—*By Joanna C. Colcord. New York: Russell Sage Foundation*, 1939. 249 pp. Price, $.85.

This book, which is an outline of what citizens ought to know about their community, had its origin in a pamphlet by Margaret Byington, first published by the Russell Sage Foundation in 1911 entitled "What Social Workers Should Know About Their Own Community." It is designed to enable interested individuals or groups to study their health, education, safety and welfare status or activities in order that they may be better prepared to take an active part in improving these conditions. It does not pretend to be an original plan for a study of a community but brings together the criteria in the various fields and the standards of good practice and good service set by various organizations in these fields.

There are 19 chapters, covering the method of study and use of material; organization and development of the

community; local government; public safety; workers and conditions of employment; housing and city planning; various aspects of health and medical care; education; recreation; religious agencies; public welfare; foreign-born and racial groups; clubs and associations; and agencies for planning and coordination. There is a comprehensive list of agencies interested in this field and a bibliography of references. It is well indexed.

One feels that there would have to be very adequate guidance of the groups using the book in order that the correct interpretation pertinent to the community under study might be made of the data collected. As much of the material is drawn from agencies having a specialized point of view it, in many instances, must lead to the consideration of details of relatively slight importance. This, however, under intelligent guidance should not cause difficulty.

The book is of particular interest to health workers that they may see what criteria and standards have been set up to guide the activities in other fields of community service. W. F. WALKER

Your Health Dramatized: Selected Radio Scripts—*By W. W. Bauer, M.D., and Leslie Edgley of NBC. New York: Dutton,* 1939. 528 pp. Price, $2.25.

For the health officer who has neither the staff nor skill for radio production of professional quality, this volume is a gold mine of accurate and effective programs. Its medical author directs health education for the American Medical Association; its radio author is on the staff of NBC. Produced by NBC, the series won First Award from the Institute of Education by Radio in 1938. Unsolicited audience response shows people listen to the programs.

There is little more reason for a good radio script to die with one production than for a good play to die. Season, circumstance, and special local situations renew timely interest. Communicable diseases, degenerative diseases, positive health, and the need for better health facilities are dealt with in these 32 scripts, thus creating the opportunity for experimenting with short, special-subject series, using local talent.

As in most educational programs, the characters are typed caricatures which make them adaptable to any locality. Sniffling Chester and the music salesman (script 11) give punch to the story of the common cold. Three well-pointed episodes in a 13-minute script (script 19) personalize the problem of water, waste, and sanitation. Bright young Dr. Stewart does a nice job of deflating and educating big, dumb, politically-appointed health officer Petersen (script 9); one can only regret that it is impolitic similarly to dramatize the problem when it is found in reverse form.

A useful introduction describes the possible use of the material in actual broadcast, simulated broadcast, on the stage, and in the classroom. Educators and health officers who are unfamiliar with sources of such ready-made script material should inquire also from the script exchange of the United States Office of Education.

PHILIP S. BROUGHTON

Real Living: A Health Workbook for Boys in Junior High Schools—*By Ross L. Allen, Dr.P.H. New York: Barnes,* 1939. 106 pp. Price, $.50.

This material is in the form of the usual health workbook, covering various phases of personal hygiene such as growth, nutrition, respiration, special senses, recreation, and the like. Each of the 23 sections starts with some informational statements, then gives a bibliography for reading, and is followed by a list of questions of the essay type.

CHARLES H. KEENE

Rehearsal for Safety: A Book of Safety Plays—*By Fanny Venable Cannon. New York: Dutton,* 1939. 132 pp. Price, $1.00.

Safety education has assumed considerable importance in our modern school program. Various devices and activities have been adopted to integrate safety education with the school curriculum. The inculcation of safety habits, like any other habits, depends upon interest aroused, pleasurable outcomes and repetition in favorable situations. This little book of safety plays capitalizes on the child's dramatic interests and makes it possible for him to participate actively in make-believe situations which guide him into awareness of dangers seen and unseen. The material is cast into simple dramatic form and requires very little, if any, scenery. Eight short plays make up the volume together with a list of questions at the end of each play. This book should prove helpful to teachers in the elementary and junior high schools to supplement other phases of their safety program.

RICHARD A. BOLT

Epidemiology in Country Practice—*By William Norman Pickles. Baltimore: Williams & Wilkins,* 1939. 110 pp. Price, $2.50.

As Sir William Budd wrote many years ago, "where the question at issue is that of the propagation of disease by human intercourse, rural districts, where the population is thin, and the lines of intercourse are few and always easily traced, offer opportunities for its settlement which are not to be met with in the crowded haunts of large towns." The author has been practising in a rural area about Wensleydale in northern England for twenty-five years. The population is a stable one and "there was hardly a soul, man, woman, or child, of whom I did not, and do not, know even the Christian name."

Through these many years he has accumulated notes and observations upon the manner in which infectious diseases were introduced and spread among his patients. He has now undertaken to bring these together in this small volume. Although his principal contributions are upon the concomitant occurrence of herpes zoster and chicken pox, upon a small local epidemic of Sonne dysentery, upon the incubation period of "epidemic catarrhal jaundice," and upon an outbreak of "epidemic myalgia," he includes scattered observations upon the duration of the periods of incubation and infectivity of common communicable diseases, measles, scarlet fever, whooping cough, and mumps. The book represents the commendable effort of a country practitioner to contribute to the sum total of epidemiological knowledge by reporting his own direct—even though limited—observations.

KENNETH F. MAXCY

Alcohol: Its Action on the Human Organism—*By the Alcohol Committee of the [British] Medical Research Council (3rd rev. ed.). London: His Majesty's Stationery Office,* 1938. 159 pp. Price, $.30.

The first edition of this well known report was issued in 1918 by an Advisory Committee of the Central Control Board (of Liquor Traffic). There were then 11 distinguished physicians and scientists serving on the committee.

The second edition was published in 1924 under the auspices of the same committee. But it had then become the Alcohol Committee of the Medical Research Council, consisting of 8 of the original members.

The 1938 edition is sponsored by 5 surviving members—Sir Henry H. Dale, Professor M. Greenwood, Sir Edward Mellanby, Dr. C. S. Myers, and Sir Charles S. Sherrington.

There are 11 chapters, including an introduction and a 9 page chapter of

conclusions. The other 9 chapters deal with such subjects as—the mental effects of alcohol, alcohol as a food, the action of alcohol on digestion, the poisonous effects of alcohol, alcohol as a medicine. The point of view of the committee is objective and disinterested. The work is scholarly, and it is written in clear simple English.

The chapters of conclusions summing up the effects, indicates that the main action of alcohol is confined to the nervous system and that alcohol is a narcotic and not a stimulant; it explains when narcotic action may be useful and the limitations to the value of alcohol as a food; it emphasizes that the use of alcohol as an aid to work is physiologically unsound, and sets forth the conditions under which its use may be physiologically permissible.

Finally the committee states that the temperate consumption of alcoholic liquors, in accordance with certain rules the committee has set forth, " may be considered to be physiologically harmless in the case of the large majority of normal adults; this conclusion, it may be added, is fully borne out by the massive experience of mankind in wine-drinking and beer-drinking countries. On the other hand, it is certainly true that alcoholic beverages are in no way necessary for healthy life; that they are harmful or dangerous if the above mentioned precautions are not observed; further, that they may be definitely injurious for children and for most persons of unstable nervous systems, notably for those who have had severe injuries of the head or who have suffered from attacks of mental disorder, or from nervous shock."

REGINALD M. ATWATER

Evaluation of the Industrial Hygiene Problem in the State of Texas —*By George W. Cox, M.D. Austin: State Department of Health,* 1939. 46 pp.

Findings are reported of the survey of a sample of Texas Industry for the purpose of: (1) bringing a program of public health to the adult population, using industrial groups as a point of approach; (2) locating potential health and accident hazards arising out of the nature of the employment; (3) informing personnel as to materials used, products manufactured, by-products, processes involved, environmental surroundings, and general working conditions. The report contains samples of forms used in the survey, extensive tabulations of results illustrated with graphs, together with an effective summary which points out major problems. Industries were classified according to recommendations of the U. S. Public Health Service. Texas was found to have a higher exposure rate than other states in 21 of the 31 materials compared. The study gives a practical basis for future program development.

IRA V. HISCOCK

Annual Report of the Director of the Pan American Sanitary Bureau —*Surgeon General H. S. Cumming (Retired), Fiscal Year 1938–1939.* Washington, D. C.

This report is full of interest. Very little is said about the Tenth Pan American Sanitary Conference held in Bogota in September, 1938, though it was unusually important not only on account of the program, but because of the attendance, and for the first time women delegates were seated. We are promised the early appearance of the transactions.

Among the more important matters discussed are fellowships and internships in the United States for Latin American doctors. While not on a complete working basis, already six Chilean physicians have been appointed to internships in the hospitals of the U. S. Public Health Service. A number of other Latin American physicians have been aided in ob-

taining training in the United States. The Bureau has also assisted Venezuelan authorities in securing in the United States the services of a number of Spanish speaking nurses and is attempting to do the same for at least one other of our Spanish American republics.

Other important pieces of work are the study of nutrition in the tropics and the preparation of a Manual of Water Supplies giving the minimum standards applicable to water for human consumption.

No major epidemics were reported during the year in the Western Hemisphere. Early in 1939 a severe earthquake occurred in Chile. Sufficient physicians were available, but the Bureau gave the services of a sanitary engineer and chlorine for the disinfection of the water supplies.

Of great interest are the reports of the six members of the Field Personnel, four physicians, and two sanitary engineers. The report must be read to be appreciated and it would be well for physicians and sanitarians generally to keep in touch with what is going on in our sister republics to the south, and especially those matters in which we are taking an active part in coöperation with them. MAZŸCK P. RAVENEL

Bacterial Metabolism—*By Marjory Stephenson (2nd ed.). New York: Longmans Green,* 1939. 391 pp. Price, $7.50.

An advanced textbook, markedly improved over the first edition issued as a monograph. Chapter headings are: Introduction, Respiration, Polysaccharides, The Fermentation of Hexoses, The Decomposition of Proteins, The Metabolism of Nucleic Acid, Nutrition and Growth, Nitrogen Fixation, Autotrophic Bacteria, Bacterial Photosynthesis, Enzyme Variation and Adaptation, appendix giving formulae of media, and bibliography and author index.

Bacterial Metabolism is probably the best text in English on the subject. It includes in general a discussion of the more recent developments in the fields discussed; unfortunately that of the fixation of CO_2 by heterotrophic bacteria is omitted. Some difficulty is experienced in using the references since errors have crept in. It is also difficult to understand the author's use of such basic and important terms as respiration and fermentation; the former is defined as " any chemical process, aerobic or anaerobic, by which energy is liberated by the cell." Fermentation apparently is not defined, but the term is used to characterize carbohydrate breakdown (respiration (?) according to definition) hence, a clear understanding of the use of respiration and fermentation is difficult.

In the author's discussion of the fermentation of hexoses, a clever diagram is used to show the operations of the Embden-Meyerhof-Parnas scheme of glycolysis. The accompanying discussion of the rather complex scheme is clear.

Author's style is clear and discussive. The text is recommended.

C. H. WERKMAN

Public Health in South Africa—*By E. H. Cluver, M.D. (2nd ed.). Johannesburg: Central News Agency,* 1939. 342 pp. Price, $4.00.

As Secretary for Public Health, and chief health officer of the Union Department of Public Health, the author has assembled essential data regarding public health problems and control measures in South Africa. The book is primarily intended to meet the requirements for medical and under-graduate public health students, but contains much useful material for workers in the field of public health in South Africa and elsewhere. Photographs and diagrams are helpful supplements.

The book is divided into 30 chapters,

the first group dealing with problems of sanitation of the environment. Consideration is given to geological configuration of the region, and to the climate, stressing the importance of measurement of the cooling power of the atmosphere and its regulation by ventilation technics. Light and sun radiations are briefly treated, followed by a discussion of the water supply—its examination and purification. The science of nutrition is sketched and suggestions as to the causes of the high degree of malnutrition in South Africa are given, with reference to the fourfold problem of wages, dietetic education, subsidized food, and improved farming methods. A description of food poisoning, with illustrations, is followed by the regulations for meat inspection. Milk-borne diseases are mentioned together with methods for their control which appear as yet to be a local community task. Dwelling and housing regulation also seems to be a local problem; criteria are given for house inspection and far sighted town planning including slum elimination methods. The problem of refuse disposal is a real one in a land where sewerage is inadequate, and several pages are devoted to disposal of household wastes and stable manure.

The succeeding 14 chapters are devoted to a discussion of the epidemiological diseases of the region. Each disease is explained, the problem outlined, and preventive measures are discussed. The sections concerning Plague, Typhus, and Schistosomiasis, contain careful analyses of the diseases, with methods for control. Pneumonia, which has a high mortality rate, is only briefly discussed. Smallpox and leprosy, important diseases in South Africa, are more fully discussed, and the text is supplemented by excellent case photographs.

The last five chapters are devoted to public health administration in South Africa. Terms of the public health act of 1919 are elucidated, including provisions for tuberculosis, venereal infection, and smallpox. Other regulatory acts include the Aviation Health Act of 1935, specially designed to prevent the spread of cholera, plague, yellow fever, typhus, and smallpox. The importance of vital statistics based on sufficient observations is stressed. An appendix to this chapter gives the international list of causes of death and a list of undesirable terms used in order to train physicians of the region to follow standard terminology to insure accurate vital statistics. Industrial hygiene in the area is practically limited to gold mining, and the only labor is native. Compensation for disabilities in the opinion of the author, would be too great a burden for the companies, and as yet "miner's phthisis" is the only such liability controlled by legislation. Child labor, hours, and sanitary conditions for working are said to be rigidly controlled.

IRA V. HISCOCK

Public Works Engineers' Yearbook, 1939—*Chicago: American Public Works Association,* 1939. 457 pp. Price, $3.50.

This 1939 *Yearbook* of the American Public Works Association follows much the same pattern as the one published in 1938. It contains in Part 1 a review of events and developments in the public works administration and engineering field touching upon such subjects as personnel, planning and programming, streets, roads, sewerage and sewage treatment, water works practice, street cleaning with refuse collection and disposal, traffic control, street lighting, flood control, irrigation and drainage.

Current problems in public works are treated in Part 2 through the publication of the discussions which took place at the last Public Works Congress held in New York City. A complete index serves to make this material more useful.

ARTHUR P. MILLER

Real Living: A Health Workbook for Boys in Senior High Schools—*By Ross L. Allen, Dr.P.H. New York: Barnes,* 1939. 68 pp. Price, $.50.

This is Book II of the series, containing material, on the same plan as Book I, on some 13 topics, getting more into the field of communicable diseases, and discusses also preparation for marriage, traffic safety, alcohol and tobacco, and industrial hygiene and safety. With the properly trained teachers to guide, emphasize, and stimulate interest, these could be worth while material for health instruction. CHARLES H. KEENE

BOOKS RECEIVED

PUBLIC HOUSING IN AMERICA. Compiled by M. B. Schnapper. New York: Wilson, 1939. 369 pp. Price, $.90.

THE VITAMINS. A SYMPOSIUM. American Medical Association. Chicago, 1939. 637 pp. Price. $1.50.

GRAPHIC PRESENTATION. By Willard C. Brinton. New York: Brinton Associates, 1939. 512 pp. Price. $5.00.

INDUSTRIAL HEALTH. ASSET OR LIABILITY. By C. O. Sappington. Chicago: Industrial Commentaries, 1939. 224 pp. Price, $3.75.

HEALTH IN HANDCUFFS. By John A. Kingsbury. New York: Modern Age Books, 1939. 210 pp. Price, $.75.

BIOLOGICAL PRODUCTS. By Louis Gershenfeld. New York: Romaine Pierson, 1939. 236 pp. Price, $4.00.

EAT AND REDUCE. By Victor H. Lindlahr. New York: Prentice-Hall, 1939. 194 pp. Price, $2.50.

CHILD MANAGEMENT SERIES. YOUR CHILD AND DIET. By Cyril V. Pink. 141 pp. YOUR CHILD AND HEALTH. By G. M. Cooper. 111 pp. YOUR CHILD AND BEAUTY. By Cherith Howe. 129 pp. New York: Chemical Publishing Co.. 1939. Each $1.50.

A MIRROR FOR SURGEONS. Selected Readings in Surgery. By Sir D'Arcy Power. Boston: Little Brown, 1939. 230 pp. Price, $2.00.

THE WAY LIFE BEGINS. By Bertha C. Cady and Vernon M. Cady. rev. ed. New York: American Social Hygiene Association, 1939. 80 pp. Price, $1.50.

PENNY MARSH. SUPERVISOR OF PUBLIC HEALTH NURSES. By Dorothy Deming. New York: Dodd, Mead, 1939. 303 pp. Price, $2.00.

HIGH SCHOOLS AND SEX EDUCATION. By Benjamin C. Gruenberg and J. L. Kaukonen. Washington: Government Printing Office, 1939. 110 pp. Price, $.35.

MILK AND NUTRITION. Part IV. New Experiments Reported to the Milk Nutrition Committee. Shinfield, England: National Institute for Research in Dairying, 1939. 70 pp. Price, $.75.

FACTS ABOUT NURSING. 1939. By The Nursing Information Bureau of the American Nurses Association. New York: Nursing Information Bureau, 1939. 59 pp. Price, $.25.

THE PHOSPHATASE TEST FOR CONTROL OF EFFICIENCY OF PASTEURIZATION. By H. D. Kay, R. Aschaffenburg and F. K. Neave. Shinfield, England: Imperial Bureau of Dairy Science, 1939. 54 pp. Price, $.75.

HANDBOOK OF PUBLIC HEALTH BACTERIOLOGY AND CHEMISTRY. Department of Public Health, San Francisco. 2d ed. San Francisco: Stacey, 1939. Price, $1.50.

EDUCATIONAL PROGRAMS FOR EXPECTANT PARENTS. Analysis of Replies to a Questionnaire Survey. By Ellen D. Nicely and Ella Geib Greene. Cleveland: Cleveland Child Health Association, 1939. 72 pp. Price, $.50.

MANUAL FOR BOARD MEMBERS. Material assembled by Ella Geib Greene. Edited by Florence LaGanke Harris. Cleveland: Cleveland Child Health Association, 1939. 42 pp. Price, $.50.

PRELIMINARY SURVEY OF INDUSTRIAL HYGIENE PROBLEMS OF INDIANA INDUSTRIES. By The Bureau of Industrial Hygiene. Indianapolis: Indiana State Board of Health, 1939. 162 pp.

ELEMENTS OF SANITATION. By Edward S. Hopkins. New York: Van Nostrand, 1939. 435 pp. Price, $4.00.

FOOD VALUES OF PORTIONS COMMONLY USED. By Anna dePlanter Bowes and Charles F. Church. 2d ed. Philadelphia: Philadelphia Child Health Society, 1939. 31 pp. Price, $1.00.

A SELECTED PUBLIC HEALTH BIBLIOGRAPHY WITH ANNOTATIONS

RAYMOND S. PATTERSON, PH.D.

As the U. S. Grows Older—Here you will find a stimulating discussion of recent trends in the several important causes of death, and their effect upon longevity. The whole paper is packed with facts which cannot even be mentioned here, but if any deserve to be singled out, these do: diphtheria still stands fourth in numerical importance in young children; and tuberculosis is first among adolescents and young adults (15–45). Why should the spirit of (public health) mortals be proud?

ANON. Major Causes of Death, Increase in Life Expectancy, and Population Changes in the United States. Pub. Health Rep. 54, 46:2054 (Nov. 17), 1939.

A. M. A. Platform—Unified federal health agency; allotment of funds based upon need; local responsibility for meeting needs; extension of medical care for the necessitous; utilization of existing medical and treatment services; expansion of public health and medical measures. These are the planks in the newly promulgated stand of the A. M. A.

ANON. The Platform of the American Medical Association. J.A.M.A. 113, 22:1966 (Nov. 25), 1939.

Henry Aldrich vs. Case History—Gorgeously satirical is this depiction of the way a social work publicist would have written Clifford Goldsmith's "What a Life." Any health worker who cannot find a moral in this to influence his own efforts at propagandizing is simply hopeless.

BEYEA, B. Subtle as a Sledgehammer, or the Social Work Touch in Playwriting. Channels (Social Work Publicity Council). 17, 2:21 (Oct.-Nov.), 1939.

Disabling Sickness in Negroes—When the occupations of negro and white males become more nearly alike the excess of disability rates among negroes tends to disappear. The moral of this study seems to be that it is the difference in work and economic status rather than race *per se* that produces the unfavorable health picture for the negro.

BRINTON, H. P. Disabling Morbidity and Mortality among White and Negro Employees in the Slaughter and Meat Packing Industry, 1930–34 Inclusive. Pub. Health Rep. 54, 44:1965 (Nov. 3), 1939.

Conserving Vitamin A—Mineral oil used as a bowel lubricant, it is reasonable to assume, will take up and carry away fat soluble vitamins. If the liquid petrolatum is first saturated with carotene it prevents the oil from removing this essential from the alimentary tract, we now learn. One may hazard the prognostication that we shall soon be enjoying our vitamin plus mineral oil.

CURTIS, A. C., and BALLINGER, R. S. The Prevention of Carotene Absorption by Liquid Petrolatum. J.A.M.A. 113, 20:1785 (Nov. 11), 1939.

Nursing Visit Content—Nursing visit records in two county health units were studied to discover evidences of improved health practices resulting from the visits. It was found that the number of satisfactory conditions that became worse between visits was about equal to the number that improved. The implications are considered and should be read in full: summarization has no place in this note.

DERRYBERRY, M. Nursing Accomplishments

as Revealed by Case Records. Pub. Health Rep. *54, 46:2035 (Nov. 17), 1939.*

Chick Embryo or Calf Lymph Virus—Among a group of 36 babies vaccinated with chick embryo vaccine virus, all but two had takes when re-vaccinated 2 to 3 years later, whereas of 34 children vaccinated at birth with calf lymph virus, 25 were still immune when re-vaccinated after the same interval. If this means that immunity from smallpox is not lasting when culture virus is used, it will outweigh the several advantages which this material seems to possess. It is evident that this issue remains to be settled.

DONNALLY, H. H. Smallpox Vaccination of Infants. J.A.M.A. 113, 20:1796 (Nov. 20), 1939.

Charles Darwin, Remover of Trammels—Ridiculing early efforts in child study, one university lecturer ironically prophesied that, some day, institutions of learning would have courses in child psychology. Reading of this devastating disparagement of Darwin's and other studies, one is inclined to wonder how tolerant he may be of new ventures in learning to understand man.

GESELL, A. Charles Darwin and Child Development. Sci. Month. 49, 6:548 (Dec.), 1939.

Pet Aversions in Foods—University students were given a list of foods and asked to check the ones they disliked most. Buttermilk, organ meats, oleomargarine, parsnips, eggplant, turnips, caviar, and shellfish seem to top the list, and the foods that rank high in being disliked are likewise most unfamiliar. Women have more food aversions than men.

HALL, I. S., and HALL, C. S. A Study of Disliked and Unfamiliar Foods. J. Am. Dietet. A. 15, 7:540 (Aug.-Sept.), 1939.

Saliva and Caries—Saliva from the mouths of persons free from dental caries will protect tooth enamel against solution by acids to a greater extent than will the saliva of persons with active decay. Further, a diet low in carbohydrates but high in proteins and 5 per cent vegetables increases the capacity of saliva to neutralize acid.

KARSHAN, M. Factors in Saliva Correlated with Dental Caries, (and) WILLS, J. H., and FORBES, J. C. Dietary Effects Upon the Acid Neutralizing Power of Saliva. J. Dental Res. *18, 5:395 (Oct.), 1939.*

Evidence of Wide Distribution of Polio Virus—Virus has frequently been recovered from the stools of frank cases of poliomyelitis, and from patients with minor illnesses associated with the disease. This report extends the findings to healthy contacts, and offers corroborative evidence that the virus may be spread by healthy carriers.

KRAMER, S. D., *et al.* Recovery of the Virus of Poliomyelitis from Stools of Healthy Contacts in an Institutional Outbreak. Pub. Health Rep. 54, 43:1914 (Oct. 27), 1939.

Children vs. Spinach—Youngsters have taste buds on cheeks and in throat that disappear during adolescence. This may explain the child's dislike for foods which he later learns to accept. Pineapple juice of five degrees of sweetness was tried on older boys and girls and men and women. Age and sex influence upon taste are recorded.

LAIRD, D., and BREEN, W. J. Sex and Age Alteration in Taste Preferences. J. Am. Dietet. A. *15, 7:549 (Aug.-Sept.), 1939.*

Public Defenses against Propaganda—Close home to all health "experts" will come this dissertation on how to sensitize oneself against name calling, transference technics, the testimonial, card stacking, and band wagon methods that are the stock-in-trade of the propagandist—and in our business, who isn't?

LINDEMAN, E. C. The Ramparts of Truth. National Parent-Teacher. 34, 3:21 (Nov.), 1939.

Inquiry into Acne—On the radio they called it "adolescent skin" when unctious assurances were given that U-know-who's yeast would end those unsightly pimples. Almost as sketchy assumptions have been propounded naming focal infections, allergy, disturbed metabolism, etc., etc., as the cause. Now comes a truly scientific inquiry which can establish no evidence of any relationship between acne and endocrine imbalance even though the appearance of acne is associated with sexual maturation.

LYNCH, F. W. A Clinical Study of Acne in University Students. J.A.M.A. 113, 20: 1792 (Nov. 11), 1939.

Mental Hygiene for the Multitude—Suggesting the possibilities in psychiatric service for the public through state hospitals and social agencies, the method by which the job is carried out in one city is recounted.

WATSON, J. Psychotherapy for the Poor. Ment. Hyg. 23, 4:558 (Oct.), 1939.

Anti-Rabic Vaccination of Dogs—Evidence from many sources is reviewed which leads to the conclusion that 5cc. of non-virulent vaccine given in one dose does not protect the dog against subsequent experimental infection. However, it is hardly to be expected that this will deter enthusiastic officials from continuing to boost routine dog vaccination projects.

WEBSTER, L. T. The Immunizing Potency of Anti-rabic Vaccines. Am. J. Hyg. 30, 3:113 (Nov.), 1939.

School Health Services that Educate—Health workers will be interested in the manner of presentation adopted in this paper which takes the reader on a come-and-see tour through two imaginary school medical services in the Neanderthal School and the Utopian School. It will not be difficult for you to imagine the type of health units you will discover in each.

WILSON, C. C. The Educational Values of School Medical Services. J. Health & Phys. Ed. 10, 9:506 (Nov.), 1939.

Fecundity and TB—What is your pet assumption about the cause of the higher tuberculosis incidence in young women? Is it late hours, scanty clothing, reducing diets, or industrialization? None of these is susceptible of statistical confirmation, but there is a relationship between birth and tuberculosis rates. Among young women the tuberculosis decline slowed up markedly when birth rates rose after the war. If the relationship is significant, then better prenatal hygiene should be helpful in bettering the tuberculosis situation in young adult female groups.

WOLFF, G. The Decline in Tuberculosis Mortality in Specific Age Groups in the United States and the Absence of this Decline in Young Women After the World War. Am. J. Hyg. 30, 3:63 (Nov.), 1939.

ASSOCIATION NEWS

SIXTY-NINTH ANNUAL MEETING
DETROIT, MICH.
October 8–11, 1940
HEADQUARTERS—Book-Cadillac Hotel and Statler Hotel

STANDARD METHODS FOR THE EXAMINATION OF WATER AND SEWAGE

THE eighth edition of *Standard Methods for the Examination of Water and Sewage* appeared in 1936. The first printing of 3,000 copies was issued in June, 1936; the second printing of 3,000 copies issued in March, 1937; and the third printing of 2,000 copies issued in September, 1938. A fourth printing will issue late in 1939.

In a text of this type, errors are made by the editors or the printer as the material is prepared, and such errors are corrected as found and as later printings issue.

The complete record of corrections made in the second and third printings, together with those indicated for correction in the forthcoming fourth printing follows. Each correction is numbered and there follows each number two, three, or four asterisks (*) which indicate the printing in which the correction has become or will become effective.

Reference to the title page of the copy in the possession of any individual will disclose which printing he has. If, for example, he is using the second printing, correction numbers followed by two asterisks (**) have been made in that copy. Corrections marked with four asterisks (****) will not be made until the fourth printing issues late in 1939.

Users of the text should check their copy and enter all corrections. In the interest of all laboratory workers, it is important that any further errors be brought to the attention of the editorial committee.

While all the corrections listed have appeared important to the editorial committee, particular attention is invited to items 27 and 31.

On page 213 of the text, a provision was inadvertently carried forward from earlier editions. Correction 27 indicates that a 24, not 48, hour incubation period should be used with secondary or confirmatory broth tubes. The correction brings this portion of the text in accord with the schematic outline on page 216.

Correction 31 relates to an amendment to R. D. Scott's chromate-dichromate standards for the estimation of residual chlorine. While this method is provisional (not standard), it has been widely used. The substitution of the boric acid-borax buffer eliminates the

white precipitate which formerly developed in the standard tubes and is a definite improvement.

The current tendency toward examination of 100 ml. portions of water accentuates the need for precision in making up broth used for primary or secondary fermentation tests. It is feared that the failure of some workers to obtain concordant results in various 10, 50, and 100 ml. plantings may be due to failure to consider the need for reasonably exact concentrations of the food constituents. Concentrated lactose broth must be prepared so as to obtain a concentration of 0.3–0.5 per cent each of lactose and of peptone in the mixture after the sample has been added to the medium.

Definite plans have not been made for the preparation of a new edition (the ninth) but it will not be issued before 1942.

JOHN F. NORTON,
American Public Health Association
HARRY E. JORDAN,
American Water Works Association

*1.*** *Page* *1.* In paragraph 3, change "Parts III and VI" to read "Parts III and IV."

*2.*** *Page* *20.* In section 1.11—Place quotation marks before and after the words "20 per cent."

*3.*** *Page* *29.* Change 12th line under *2. Procedure* to read "Dissolve the combined sulfides in nitric acid and hydrochloric acid, evaporate to dryness, and redissolve the residue in hydrochloric acid and repeat" . . .

*4.*** *Page* *37.* In *section 1.4,* change final line to read: "1 ml. is equivalent to 0.05 mg. of fluorine."

*5.**** *Page* *43.* Change 2nd line under *2. Procedure* to read "dilute to the mark and mix thoroughly."

*6.*** *Page* *46.* Change reference in line 2 to read "(Part I, Sec. XVIII, A, 3)."

*7.*** *Page* *53.* Place parentheses about words "whole titer" in last two lines.

*8.*** *Page* *54.* Change the figures "30.504" in the table following the word Bicarbonate to "61.008."

*9.*** *Page* *54.* Place asterisk at the end of first sentence after table and insert footnote-- "In routine practice a variation of from 15% in waters of less than 50 p.p.m. residue down to a 2% variation in waters over 1,000 p.p.m. residue may be expected."

*10.**** *Page* *63.* Change opening part of first paragraph under *2. Procedure* to read "Measure 200 ml. of the sample into a 500 ml. Pyrex Erlenmeyer flask. Place 200 ml. of distilled water in another similar flask. Treat the contents of each flask in the following manner: Boil 15 minutes to expel free carbon dioxide. Add exactly 25 ml. of soda reagent and mix thoroughly. Boil 10 minutes," etc.

*11.*** *Page* *65.* Add an asterisk after the word *made* in the sixth line and insert a footnote— "A blank may be run using the indicator with freshly prepared ammonia free water, titrating to a definite color, and deducting in all routine determinations the amount of acid used with the blank."

*12.***** *Page* *70.* Transpose the 7th and 8th lines from the bottom of the page.

*13.**** *Page* *74.* In section 1.1 after the word *oxidized* add "as evidenced by the persistence of a faint pink color."

*14.*** *Page* *75.* In last line of *section 2.2* change "6 N hydrochloric acid" to read "3 N hydrochloric acid."

*15.*** *Page* *86.* In *section 1.3,* change the second sentence to read "To this add 140 g. of C.P. ammonium chloride and 350 ml. of C.P. ammonium hydroxide (sp. gr. 0.90)."

16.*** *Page 87.* In next to last line on page, change "0.9534" to read "0.8534."

17.*** *Page 89.* The drawing should show the water discharge lines leading to the catch basin cut off 1" *above* the top of the basin. This change is made so as indicate equipment from which no back siphonage may occur.

18.*** *Page 92.* Change second line to read "Part II" instead of "Part I."

19.*****Page 110.* In *section 1.4* the formula for sodium bisulfite should read "$NaHSO_3$."

20.*****Page 137.* In the 7th line of *section 1.3,* change the words "oxidizing capacity" to read "oxygen consuming capacity."

21.** *Page 140.* In the drawing of the sampler, the edge of the lid should be shown flush with the outside of the sampler, i.e., 6¼" in diameter.

22.** *Page 141.* Change "mg." in the last line to "g."

23.*** *Page 153.* Subheadings in the table should read "Chlorides in the water (parts per million)" and "Dissolved oxygen in parts per million by weight."

24.** *Page 177.* Make figures in third line from bottom of page read "50 and 20 mm."

25.** *Page 203.* Delete "0.05" in line 7 and insert "0.5" to make read "0.5 per cent."

26.** *Page 204.* Make lines 7 and 8 of *section L* read "basic fuchsin (85 to 90 per cent dye content) in water."

27.*** *Page 213.* Change the figure "48" in *sections 2.2 and 2.3* to read "24."

28.** *Page 221.* Change "c.c." at top of table to "ml."

29.*** *Page 225.* Insert in line 2 of *section 1.2* after the word "bottle" the words "in presence of excess of crystals."

30.*** *Page 227.* Change "20" in line six to read "0.05."

31.*****Page 233.* Delete present *section 1.2,* on page 233, and insert "1.2. Boric acid-borax buffer solution pH 6.5. Refer to page 285 for revised directions for the preparation of this buffer solution."

32.*** *Page 234.* Change lines 1 and 2 of *section 1.1* to read "Dissolve 5.0 g. of potassium dichromate and 20 ml. of concentrated sulfuric acid . . ."

33.** *Page 261.* Substitute in line two of *section F* the word "selective" for "specific."

34.** *Page 264.* In the list of specifications of ingredients, f4 should read "Certified by the Biological Stain Commission (Cert. No. CBg-3 (Coleman and Bell Co., Norwood, Ohio) or equivalent)."

35.** *Page 269.* Change the word "complete" in line 2 to "completed."

36.*****Page 285.* Following the bibliography, insert the following:

"Chlorine standard—buffer solution (Scott)." (The above line to be center heading) "boric acid-borax buffer solution, pH 6.5.

(a) Dissolve 12.4 g. boric acid (H_3BO_3) in distilled water and make up to 1 liter. This solution is approximately M/5 and has a pH of about 4.6.

(b) Dissolve 3.8 g. borax ($Na_2B_4O_7$) in distilled water and make up to 1 liter. This solution is approximately M/100 and has a pH of about 9.2.

(c) Add a sufficient volume, usually about 80 ml., of (b) to 1 liter of (a) to produce a buffer solution of pH 6.5."

37.** *Page 286.* Change the first sentence under *Option 2* to read "Into clean wet bottles add approximately 0.02 to 0.05 g. of powdered sodium thiosulfate."

DECEASED MEMBERS

Loran E. Orr, M.D., Springfield, Ill., Elected Member 1936

Willard B. Soper, M.D., West Haven, Conn., Elected Member 1927

Fred Wasserman, Ancon, Canal Zone, Elected Member 1936

H. E. Young, M.D., Victoria, B. C., Canada, Elected Member 1916, Elected Fellow 1922, Elected Honorary Fellow 1932

Livingston Farrand, M.D., Brewster, N. Y., Elected Member 1910, Elected Fellow 1922

Allan J. Hruby, M.D., Chicago, Ill., Elected Member 1932

Charles R. Tyler, New York, N. Y., Elected Member 1921

APPLICANTS FOR MEMBERSHIP

The following individuals have applied for membership in the Association. They have requested affiliation with the sections indicated.

Health Officers

William B. Birnkrant, M.D., 14 Fifth Ave., New York, N. Y., Administrative Assistant in Charge of School and Child Hygiene, Dept. of Health

Gilbert M. Clarke, M.D., 8660 Madison Ave., South Gate, Calif., Assistant Communicable Disease Physician, Los Angeles County Health Dept.

John C. Greenfield, M.D., 424 Halcomb Ave., Clairton, Pa., Medical Director, Allegheny County

Robert J. Macdonald, M.D., D.P.H., Peace River Health Unit, Pouce Coupe, B. C., Canada, Director

Roy W. McGee, M.D., 501 Court House, Atlanta, Ga., Commissioner of Health, Fulton County

Marshall W. Meyer, M.D., Vaughn Library Bldg., Ashland, Wisc., Health Officer, 9th Sanitary District

William M. Moir, M.D., Bristol-Washington County Health Dept., Bristol, Va., County Health Officer

Roy V. Morledge, M.D., 311 Hart Albin Bldg., Billings, Mont., Member State Board of Health

Arthur J. Pearse, M.D., 426 Engineers Bldg., Cleveland, Ohio, Health Commissioner, Cuyahoga County Health District

Robert E. Rothermel, M.D., Lee County Health Office, Opelika, Ala., Associate County Health Officer

Harry A. Smith, M.D., City-County Bldg., Wheeling, W. Va., City-County Health Commissioner

Laboratory Section

George D. W. Cameron, M.D., D.P.H., 27 Buena Vista Road, Ottawa, Ont., Canada, Chief, Laboratory of Hygiene, Dept. of Pensions and National Health

Morley S. Lougheed, M.D., Health Dept., City Hall, Winnipeg, Man., Canada, Medical Health Officer

Dr. J. E. Schneider, 530 Orchard Ave., Yeadon, Pa., Director, Sharp and Dohme Laboratories

Herman A. Shelanski, M.A., 609 Porter St., Philadelphia, Pa., Parasitologist, Univ. of Pennsylvania and Philadelphia General Hospital

Andres Soriano, M.D., Apartado 1169, Bogota, Colombia, S. A., Head, Dept. of Serums and Vaccines, National Institute of Health

Keith R. Wright, 203 Western Reserve Bldg., Muncie, Ind., Junior Chemist, Muncie Clinical Laboratory

Vital Statistics Section

Paul M. Densen, D.Sc., Dept. of Preventive Medicine, Vanderbilt Univ., Nashville, Tenn., Instructor

Forrest E. Linder, Ph.D., 4003 5th N., Arlington, Va., Chief, Analysis and Reports Section, U. S. Bureau of the Census

Engineering Section

Franz P. Dengler, Ph.D., LL.B., R. 4, Box 352. Muskegon, Mich., Sanitary Engineer, Muskegon County Health Unit

Robert C. Hanlon, M.S., Room 14, City Hall, Des Moines, Iowa, Public Health Engineer, Polk County Health Unit

William I. Jefferies, 4 Rosemont Ave., Alexandria, Va., Sanitary Engineer, Alexandria Health Dept.

Henry H. Matthieson, 156 N. Mariposa Ave., Los Angeles, Calif., Sanitary Engineer, City Health Dept.

Walter A. Norby, B.S., City Hall, Winona, Minn., Collaborating Public Health Engineer, Dept of Health

Walter M. Scott, B.S., 145 S. 3rd Ave., Mount Vernon, N. Y., Sanitary Engineer, Westchester County Health Dept.

Industrial Hygiene Section

Edward C. J. Urban, M.S., Industrial Hygiene Office, Barre City Hospital, Barre, Vt., Industrial Hygiene Engineer, State Health Dept.

Food and Nutrition Section

Elizabeth S. Avery, M.A., 398 Marlborough St., Boston, Mass., Graduate Student in Health Education, Massachusetts Institute of Technology

Ruth C. Clouse. Ph.D., 5643 Blackstone Ave., Chicago Ill., Consultant in Nutrition, Council on Foods, American Medical Association

Elizabeth A. Dickinson, M.S., 111 North Canal St., Chicago, Ill., Assistant to Director of Nutrition Service, National Dairy Council

William A. O'Brien, A.B., 885 Main St., Hartford, Conn., Restaurant Operator

Maternal and Child Health Section

Lyman C. Duryea, M.D., 140 Cabrini Blvd., New York, N. Y., Director, Commission for the Study of Crippled Children

Linwood G. Grace, D.D.S., Dental Division, State Dept. of Health, Harrisburg, Pa., Chief

S. S. Lifson, B.S., 1226 31st Ave., Astoria, N. Y., Research Assistant, School Health Study

Virginia F. South, M.D., 107 Dwight St., New Haven, Conn., Student, Yale School of Public Health

Louis Spekter, M.D., 22 Seyms St., Hartford, Conn., Chief, Division of Crippled Children, State Dept. of Health

L. C. Newton Wayland, M.D., Santa Barbara County Health Dept., Santa Barbara, Calif., Director, Maternal and Child Hygiene

Public Health Nursing Section

Fannie M. Brooks, R.N., B.A., University of Illinois, Urbana, Ill., Assistant Professor of Home Economics

Vera J. Brown, 820 W. Locust St., Wilmington, Ohio, Nurse, Clinton County Board of Health

Anna C. Cardozo, R.N., 129 South New Hampshire Ave., Los Angeles, Calif., Assistant Chief Nurse, Board of Education

Clara G. Christie, R.N., 20 Lincoln St., New Britain, Conn., Maternity & Child Health Supervisor, Visiting Nurse Assn.

Mary M. Dunlap, M.A., 5748 Stony Island Ave., Chicago, Ill., Instructor in Public Health Nursing, University of Chicago

Lucy H. Gregory, 21 Beechwood Ave., New Rochelle, N. Y., Student, New York University

Lois K. Harper, Hamilton County Health Dept., Chattanooga, Tenn., Public Health Nursing Supervisor

Theresa H. Jenniges, B.S., 2036 Fifth Ave., S., Maywood, Ill., Teaching Supervisor, Maywood Health Center

Katherine E. Payne, B.S., R.N., State Dept. of Health, Albany, N. Y., Assistant Educational Supervisor

Lois Stearns, R.N., Middlebury Inn, Middlebury, Vt., Supervisor of Public Health Nurses, Maternal & Child Health Division, State Health Dept.

Grace F. Wilson, 4852 Oakwood Ave., Los Angeles, Calif., Field Supervisor, Health Service Section, Board of Education

Public Health Education Section

Albert W. Dent, A.B., Flint-Goodridge Hospital, New Orleans, La., Superintendent

Leona de Marc East, B.A., 317 S. State Street, Springfield, Ill., Radio Speaker, State Dept. of Public Health

William Feinbloom, Ph.D., 535 5th Ave., Room 706, New York, N. Y., Director, Public Health Bureau, American Optometric Association

Raymond U. Hilleman, M.A., 1575 Neil Ave., Columbus, Ohio, Health Educator, Ohio Public Health Association

Joseph Hirsh, B.S., A.M., U. S. Public Health Service, Washington, D. C.. Health Education Specialist, Division of Sanitary Reports and Statistics

John F. Kendrick, M.D., Dr.P.H.. State Board of Health, Raleigh, N. C., Member Field Staff, Rockefeller Foundation

Gerald M. Lacerre, Ph.G., 177 W. 102nd St., New York, N. Y., Health Inspector, New York World's Fair

Alice H. Miller, B.S., C.P.H., 6120 S. Greenwood St., Chicago, Ill., Director of Health Education, Tuberculosis Institute of Chicago and Cook County

Elizabeth D. Peck, B. S., 27 Maple St., Greenfield, Mass., Physical Director and Teacher of Hygiene, North East Junior High School

Robert B. T. Schmuck, B.A.. 2139 R. St., N.W., Washington, D. C., Technical Assistant, Division of Sanitary Reports and Statistics, U. S. Public Health Service

M. Luther Smith, M.D., Alcorn College, Alcorn, Miss., Director of Student Health and Professor of Health Education

Epidemiology Section

Alfred L. Burgdorf, B.S., C.P.H., Duncaster Road, Bloomfield, Conn., Epidemiologist, State Dept. of Health

Arthur P. Locke, Ph.D.. West Penn Hospital, Pittsburgh, Pa., Research Biochemist

Alberto Recio-Forns, M.D., 1117 Carlos 3, Havana, Cuba, Epidemiologist, Instituto Tecnico de Salubridad

Unaffiliated

Dr. Nicanor Almarza, Isabel la Catolica, 13, 4°, Mexico, D. F.

George L. Gately, M.D., 624 Bennington St., East Boston, Mass.

India G. Johnson, A.B., 663 Whitney Ave., New Haven, Conn., Student, Dept. of Public Health, Yale Univ. School of Medicine

Austin L. Joyner, M.D., Lederle Laboratories Inc., Pearl River, N. Y., Director of Research in Biologicals

Charles G. Marshall, P. O. Box 552, Sparta, N. J., Manager, Special Markets Division, Alba Pharmaceutical Co.

EMPLOYMENT SERVICE

The Employment Service will register persons qualified in the public health field without charge.

Replies to these advertisements, when keyed, should be addressed to the American Public Health Association, 50 West 50th Street, New York, N. Y., identifying clearly the key number on the envelope.

Positions Available

Young, energetic, well trained public health nurses needed in Montana for rural areas. Salary $135 per month, plus travel. Write Supervisor of Public Health Nursing, Montana State Board of Health, Helena, Montana.

Positions Wanted

ADMINISTRATIVE

Physician, M.D., class A medical school; M.S.P.H., University of Michigan, 1937; experienced district state health officer, seeks city or city-county administrative position. A367

Physician, M.P.H., Harvard; well experienced in city and rural health administration, will consider appointment as district health officer or in city or state health department. A418

Physician, M.D., McGill; C.P.H., Johns Hopkins; excellent background of communicable disease control and school health service, seeks position as epidemiologist or public health administrator. A368

Physician, M.D., Univ. of Cincinnati; with postgraduate training in venereal disease control, Johns Hopkins; is available as venereal disease control officer. A363

Well qualified physician, M.D., Rush; M.S.P.H., Univ. of Michigan; with 3 years' residence in tuberculosis, and special interest in venereal disease control, seeks responsible appointment. Excellent references. A406

Well qualified physician, with M.P.H. from Johns Hopkins, experienced as county health officer and now assistant health officer in a large city, will consider county or city administrative position. A383

HEALTH EDUCATION

Young woman, experienced teacher in health education, with M.S. in Public Health and Hygiene from University of Michigan, seeks position as health coördinator. H398

Young woman, M.A., Health Education, Teachers College, Columbia; with splendid international experience, seeks position as director of health education. H369

Well qualified woman in health education wishes position as health coördinator or health counselor. Has wide experience, and Ph.D. from New York University. H236

LABORATORY

Experienced teacher in biochemistry and bacteriology; Ph.D., Iowa; now laboratory director in midwestern state; will consider teaching, executive or administrative position. L440

Experienced teacher in bacteriology and public health; Ph.D., Cornell; now professor in grade A medical school, will consider teaching, executive or administrative position. M437

Young man bacteriologist, with training in serology; for the past 4 years bacteriologist in charge, public health laboratory; will consider opening. L427

Young man bacteriologist, M.S., Cornell; Ph.D., Rutgers; experienced in bacteriology, water supply, sewage, dairy and general public health laboratory work, extensive research in bacteriology and sanitary chemistry, high federal and state civil service ranking as bacteriologist, now employed as bacteriologist in eastern hospital; seeks responsible position in laboratory work or teaching of bacteriology, dairy industry or sanitary chemistry. L439

MISCELLANEOUS

Physician, M.D., class A medical school; training in obstetrics and public health; experienced as director of county health department, teacher of clinical obstetrics and administrator of state maternal and child health program, desires position in public health obstetrics or in

maternal and child health administration. C417

Experienced director of milk control, food and sanitation and industrial hygiene, seeks position. B.S. degree and well known record directing such work in 2 major cities and 1 state. References prominent public health personalities. I434

Young woman statistician, B.S. in Education, Univ. of Pennsylvania; M.S.P.H., Univ. of Michigan; experienced as secretarial, research and statistical worker in school of public health, desires position in the public health field. S431

Physician with M.P.H. from Johns Hopkins and experienced in teaching will consider student health service position, teaching responsibility or a combination. A445

NEWS FROM THE FIELD

AMERICAN SCIENTIFIC CONGRESS

THE Honorable Cordell Hull, Secretary of State of the United States, has announced that the Eighth American Scientific Congress will be held in Washington, D. C., from May 10 to 18, 1940, under the auspices of the Government of the United States of America. Invitations on behalf of the President of the United States have been extended to the governments of the American Republics members of the Pan American Union to participate in the forthcoming meeting. Scientific institutions and organizations are also cordially invited to send representatives to this Congress which will celebrate the fiftieth anniversary of the founding of the Pan American Union.

Serving as representatives on the Organizing Committee collaborating with the Department of State in formulating definite plans for the Congress are some fifteen distinguished Americans, among whom Dr. Thomas Parran, Surgeon General of the U. S. Public Health Service, represents the fifth section on Public Health and Medicine.

HEALTH COÖRDINATION

AN interesting report on "The Status of Health Coördination in Large Community Chest Cities" has been prepared by Bleecker Marquette, Executive Secretary, Public Health Federation, Cincinnati, Ohio, summarizing questions put recently to community chest directors in cities of 50,000 population or more.

One hundred and twenty-five cities supplied information. Of these, 67 are endeavoring to coördinate health work in the community through a council, committee, or division of some type. Nearly all provide for medical, dental, nursing, and public and private agency representation. Though nearly all are engaged in some form of health education, there are few special committees on health education. Major objectives include study and discussion of health problems, formulating programs, and improving the quantity and quality of health service.

How policies are determined, the sources of funds, executive service available, and activities were brought out by the questions submitted and the resulting data are given in Mr. Marquette's summary. The memorandum ends with a page setting forth the definitions of an approved Health Council and a potential Health Council as agreed upon by the National Committee of Health Council Executives. Copies may be obtained by writing Mr. Marquette at 312 West Ninth Street, Cincinnati, Ohio.

PROPOSED ORGANIZATION OF THE GULF AND CARIBBEAN PUBLIC HEALTH ASSOCIATION

AFTER discussions which have extended over several months among those specially interested, it was proposed at a conference held in Jacksonville, Fla., during the December meeting of the Florida Public Health Association, that the Gulf and Caribbean Public Health Association should be organized as a voluntary health association, which, it is hoped, will eventually be composed of individuals from all of the state, colonial, and national public health associations in territories adjacent to the Gulf of Mexico and the Caribbean Sea, together with representation from the Pan-American Sanitary Bureau.

For the present it is proposed that the organization be closely related to the state and national public health associations in this area, and each such group is requested to designate a representative to a planning committee which will lay definitive plans in the near

future. At a preliminary meeting of the Planning Committee held in Jacksonville the outline of the Constitution and By-laws was discussed, as well as the relationships of such a voluntary group to official health agencies in this territory, and the relationships with the American Public Health Association. Tentatively it is proposed that the Planning Committee will call a convention at some time to be determined in either Havana or Miami or both for the first session. Contact has already been established with the Public Health Association of Cuba, the Florida Public Health Association, the Mississippi Public Health Association, a newly organized group in Mexico City, and a proposed organization in Puerto Rico. Representatives from Cuba, Mexico, Venezuela, and the United States were present at the Jacksonville session.

AMERICAN MEDICAL ASSOCIATION PLATFORM

THE Board of Trustees of the American Medical Association has set up a platform indicating the trend which the A.M.A. believes should be followed in the development of health activities and medical care for the people of the United States.

The American Medical Association advocates:

1. The establishment of an agency of the federal government under which shall be coördinated and administered all medical and health functions of the federal government, exclusive of those of the Army and Navy.
2. The allotment of such funds as the Congress may make available to any state in actual need, for the prevention of disease, the promotion of health and the care of the sick on proof of such need.
3. The principle that the care of the public health and the provision of medical service to the sick is primarily a local responsibility.
4. The development of a mechanism for meeting the needs of expansion of preventive medical services with local determination of needs and local control of administration.
5. The extension of medical care for the indigent and the medically indigent with local determination of needs and local control of administration.
6. In the extension of medical services to all the people, the utmost utilization of qualified medical and hospital facilities already established.
7. The continued development of the private practice of medicine, subject to such changes as may be necessary to maintain the quality of medical services and to increase their availability.
8. Expansion of public health and medical services consistent with the American system of democracy.

MASSACHUSETTS PUBLIC HEALTH ASSOCIATION CELEBRATES GOLDEN ANNIVERSARY

THE Fiftieth Anniversary meeting of the Massachusetts Public Health Association will be held on January 27, 7:00 P.M., at the Parker House, Boston, Mass.

Professor C.-E. A. Winslow, of the Yale School of Medicine, New Haven, Conn., will speak on "A Half Century of Public Health."

ORDER OF CARLOS J. FINLAY

THE President of the Republic of Cuba has awarded decorations of the Order of Carlos J. Finlay to several public health workers from the United States and Mexico. The recipients, who were decorated at a recent meeting of the Florida Public Health Association at Jacksonville by Dr. Domingo F. Ramos, Director of Public Health in Cuba and Minister of National Defense, included Dr. Angel de la Garza Brito, Dean of the School of Hygiene, Mexico City; Dr. G. T. Dunnahoo, Past Assistant Surgeon of the U. S. Public Health Service, Miami; Dr. George MacDonnell, City Health Officer, Miami, Fla., each of whom received the Officer's medal, and Dr. Reginald M. Atwater, Executive Secretary of the American Public Health Association, New York, who received the Commander's medal.

SOUTHERN BRANCH A.P.H.A.

THE 8th Annual Meeting of the Southern Branch of the Association was held in Memphis, Tenn., November 21 and 22 in connection with the meeting of the Southern Medical Association. The sessions were well attended and a diversified program well received.

The new officers elected are:

President: J. N. Baker, M.D., Montgomery, Ala.
1st Vice-President: W. B. Grayson, M.D., Little Rock, Ark.
2nd Vice-President: V. M. Ehlers, Austin, Tex.
3rd Vice-President: Miss Donna Pearce, New Orleans, La.
Secretary-Treasurer: P. E. Blackerby, M.D., Louisville, Ky.

NEW MEXICO PUBLIC HEALTH ASSOCIATION

THE Fourteenth Annual Meeting of the New Mexico Public Health Association was held in Santa Fe, October 25–28, with an attendance of almost one hundred. This was the first meeting since the three sections—Health Officers, Sanitarians, and Public Health Nurses—were organized.

The following new officers were elected:

President—John C. Mitchell, M.D., Silver City
President-elect—R. P. Kandle. M.D., Clovis
Vice-President—M. Easter Flynn, Albuquerque
Secretary-Treasurer—F. W. Parker. Jr., M.D., Santa Fe
Representative to the Western Branch, A.P.H.A.—C. W. Gerber, M.D., Las Cruces
Representative to A.P.H.A. Governing Council—Myrtle Greenfield. Santa Fe

Out-of-state speakers included: Dr. Ethel Dunham, U. S. Children's Bureau; Dr. P. W. Covington, Rockefeller Foundation; Dr. T. D. Martin, National Education Association; A. L. Dopmeyer, U. S. Public Health Service; and Wendell Vincent, U. S. Food and Drug Administration.

FLORIDA PUBLIC HEALTH ASSOCIATION

AMONG those from outside the United States in attendance at the Eleventh Annual Meeting of the Florida Public Health Association, held in Jacksonville in December, were:

Cuba—
Dr. Domingo F. Ramos, Secretary of the National Defense and Director of Public Health
Dr. Guillermo Lage, Director of National School of Sanitation
Dr. Alberto Recio, Epidemiologist, Finlay Institute
Dr. Pedro Domingo, Bacteriologist, Finlay Institute
Dr. Pedro Kouri, Parasitologist, University of Havana
Dr. G. Agramonte, Captain, Cuban Navy
Dr. Toofilo Vega, Captain, National Police
Dr. Nilo C. Pintado, Cuban Quarantine Service, Miami
Dr. Carlos Martin, Secretary, Cuban Delegation, Havana

Mexico—
Dr. Angel de la Garza Brito, Director, School of Health and Hygiene, Mexico City

Venezuela—
Dr. Arnoldo Gabaldon, Chief Malariologist, Caracas

PENNSYLVANIA PUBLIC HEALTH ASSOCIATION

THE Pennsylvania Public Health Association held its 1939 Annual Meeting in Pittsburgh on October 18, during the American Public Health Association annual meeting. The sessions consisted of a business meeting; a dinner session with the Tri-State Food and Health Officials Association, at which Dr. John J. Shaw, the State Secretary of Health, spoke on Future Health Plans for Pennsylvania, and Dr. Arthur T. McCormack on The Philosophy of Health; and an evening session at which the principal speaker was the Honorable Fiorello H. La Guardia, the Mayor of the City of New York, who spoke of the health prob-

lems of that city and how his plans are working out in their solution.

Dr. Henry F. Vaughan presented a paper on Public Health at the Crossroads, and Dr. Edward S. Godfrey, Jr., gave recognition to two Pennsylvanians, Dr. Henry T. Price and Dr. Glenn C. King, in his talk on Recognition of Meritorious Achievements Made in the Field of Public Health.

WEST VIRGINIA PUBLIC HEALTH ASSOCIATION

THE 1939 Annual Meeting of the West Virginia Public Heatlh Association was held in Fairmont from November 6 to 8, with a registration of 151.

Included among the many interesting papers presented at this meeting were the following contributions of some of the out-of-state speakers:

What to Put into a Public Health Program—Dr. Joseph W. Mountin, U. S. Public Health Service

Why You and Uncle Sam Should Be Interested in Food—Marjorie M. Heseltine, U. S. Children's Bureau

Democracy in the Every Day. Administration of Public Health—Dr. Halbert L. Dunn, Bureau of the Census

Making the Most Effective Use of Community Facilities—Dr. Carl E. Buck, American Public Health Association

Should a Democracy Be Concerned with the Mental Health of Its Citizens?—Dr. Karl Menninger, Menninger Clinic

Whose Child Is This?—Dr. Edwin F. Daily, U. S. Children's Bureau

How Federal and State Governments May Aid in Safeguarding a Milk Supply—Leonard Male, U. S. Public Health Service

The Accomplishments of the Public Works Program in the Public Health Field—Alfred F. Beiter, Public Works Administration

The following officers were elected to assume office on January 1, 1940:

President—Dr. W. H. Riheldaffer, Romney
First Vice-President—Sarah Switzer, Logan
Second Vice-President—James McKeever, Wheeling
Secretary-Treasurer—Dorothea Campbell, Charleston

COLORADO PUBLIC HEALTH ASSOCIATION

AT its recent Annual Meeting in Colorado Springs, the Colorado Public Health Association elected the following officers to serve for the ensuing year:

President—Roy L. Cleere, M.D.
Vice-President—F. A. Forney, M.D.
Secretary—Helen Cannon
Treasurer—Omer Gillett, M.D.
Representative to A.P.H.A. Governing Council—Amos L. Beaghler, M.D.

CONNECTICUT PUBLIC HEALTH AND CLINICAL LABORATORY ASSOCIATION

AT a meeting of the Connecticut Public Health and Clinical Laboratory Association, held in New Haven on November 24, the following officers were elected:

President—Paul D. Rosahn, M.D.
Vice-President—Anne Koffinke
Secretary-Treasurer—Earle K. Borman
Councillors—L. D. Larimore, M.D., and Jessie W. Fisher, M.D.

NATIONAL CANNERS ASSOCIATION AWARD

ON November 20, 1939, the National Canners Association announced its first award for the work on botulism and food poisoning begun in November, 1919. Four persons were cited.

Dr. J. C. Geiger, Director of Public Health of the City and County of San Francisco

Dr. Karl F. Meyer, Professor of Bacteriology, University of California, San Francisco, Calif.

The citation was made to two who have died since the work was begun:

Dr. W. D. Bigelow, Washington, D. C.

Dr. Ernest C. Dickson, Stanford University, Calif.

—and reads as follows:

"For signal service to the canning industry and to the public health in the discovery of methods leading to the prevention of botulism and in the development of the canning technique relative thereto."

NEW JERSEY HEALTH AND SANITARY ASSOCIATION

AT their Sixty-fifth Annual Meeting held in Asbury Park, N. J., November 17–18, the New Jersey Health and Sanitary Association elected officers as follows:

President—L. D. Bristol, M.D., Montclair
1st Vice-President—L. Van D. Chandler, Hackensack
2nd Vice-President—Joseph E. Raycroft, M.D., Princeton
3rd Vice-President—H. F. Kilander, Ph.D., East Orange
Secretary—Edward Guion, M.D., Northfield
Treasurer—Budd H. Obert, Asbury Park

Nearly 400 persons registered, it is stated, which is by far the largest attendance on record.

MEMORIAL MEETING FOR DR. PARK

A MEMORIAL meeting for the late Dr. William Hallock Park, of New York, N. Y., was held at the New York Academy of Medicine on November 28, under the sponsorship of the faculty of New York University College of Medicine. Among the speakers were Chancellor Harry Woodburn Chase, Dr. Malcolm Goodridge, Dr. Anna W. Williams, Dr. Augustus B. Wadsworth, and the Honorable Fiorella H. La Guardia, Mayor of the City of New York.

CUTTER LECTURES

THE Executive Director of the National Advisory Cancer Council of the U. S. Public Health Service, Dr. Ludwig Hektoen, will give the first of a series of two annual Cutter Lectures in Preventive Medicine at the Harvard Medical School on January 15, 1940. He will talk on the general subject of cancer control with special reference to its public health and epidemiologic aspects. The second Cutter Lecture will be given by Dr. James B. Murphy, member of the Rockefeller Institute for Medical Research, January 22, 1940. Dr. Murphy will give a critical review of experimental studies in cancer. The Cutter Lectures have been given each year since 1912. The medical profession, medical and public health students, and others interested are invited to attend. These lectures will be held at 5 P.M., in Amphitheatre E at the Harvard Medical School.

PERSONALS

Eastern States

PAUL D. BROOKS, M.D.,* Deputy Commissioner of the New York State Department of Health, Albany, N. Y., was recently elected President of the International Association of Milk Sanitarians, in Jacksonville, Fla.

GEORGE B. DAVIS, M.D.,† of Guilford, Conn., has been appointed Health Officer of Barren County, succeeding CHESTER R. MARKWOOD, M.D.,† of Glasgow.

CHARLES E. GILL, M.D.,† State District Health Officer for the Massachusetts Department of Public Health, at Westfield, Mass., has resigned and assumed his new duties as Deputy State-County Health Officer in Prince George County, Md., with headquarters at Upper Marlboro, Md.

DR. JAMES BERNARD LAWLER, of Vernon, N. Y., has been appointed Health Officer of the township except the city of Sherrill, succeeding DR. GARY M. LEWIS, who had served for 60 years except for a short period.

JOSEPH I. LINDE, M.D.,* of New Haven, Conn., has been appointed a member of the State Tuberculosis Commission, to serve the unexpired term of the late DR. STEPHEN J. MAHER.

DR. CHARLES RANSOM REYNOLDS, former Surgeon General of the

* Fellow A.P.H.A.
† Member A.P.H.A.

United States Army, who retired in June, 1939, has been named Chief of the Division of Tuberculosis Control of the Pennsylvania State Department of Health.

Central States

WENDELL C. ANDERSON, M.D.,† of Mentone, Ind., has been appointed Director of the District Health Department, covering Dubois, Spencer, Orange, Crawford, and Perry Counties, with headquarters in Huntingburg. He succeeds CHESTER A. HICKS, M.D.†

DR. MAURICE LINCOLN FISHER, of Mansfield, Ohio, has been appointed Medical Director of Tuberculosis Work in Richland County. A half mill tax levy to provide funds for the care of indigent tuberculosis patients becomes available in January.

ALICE H. MILLER,† of Gainesville, Fla., has been appointed Director of Public Health for the Tuberculosis Institute of Chicago and Cook County, succeeding ADELAIDE ROSS,† resigned.

DR. ALBERT GRAEME MITCHELL, of Cincinnati, Ohio, has been appointed a member of the Committee on Education of the National Foundation for Infantile Paralysis.

DR. GEORGE FREDERICK MOENCH, of Mount Victory, Ohio, has been appointed Health Officer of Delaware and Delaware County.

LEWIS C. ROBBINS, M.D., C.P.H.,† has been placed in charge of the District Health Unit covering Monroe, Brown, and Lawrence Counties, with headquarters in Bloomington, Ind. He succeeds HENRY G. STEINMETZ, M.D.,† who has received a fellowship in public health at Johns Hopkins University.

DR. WILLIAM K. RUBLE, of Wilmington, Ohio, Health Commissioner of Clinton County since 1921, has retired.

Southern States

DR. RICHARD M. ADAMS,† Health Officer of Ada and Pontotoc County, Okla., has been appointed Health Officer of Tulsa.

GEORGE M. ANDERSON, D.D.S.,† of Morgan, Ga., has been appointed Commissioner of Health for Dodge County, succeeding DR. LUTHER A. BRENDLE, of Eastman.

DR. CLARENCE L. AYERS, of Toccoa, has been appointed a member of the Georgia State Board of Health for a term of six years.

BENJAMIN S. BLACK, M.D.,† of Grove Hill, Ala., has resigned as Health Officer of Clarke County.

DR. ROBERT H. BOSTWICK, JR., of Indianola, Miss., has been made director of the Union County Health Department, succeeding DR. EDWIN M. BUTLER, of Liberty, who plans to enter private practice.

WALTER J. BROAD, M.D.,† of Montgomery, Ala., has been appointed Health Officer of Bullock County, succeeding DR. HUBERT R. OWEN, of Union Springs, who resigned to do postgraduate work at the University of Pennsylvania.

DR. REUBEN M. COBLIN, of Frankfort, Ky., has been appointed Health Officer of Franklin County, to succeed DR. EUGEN C. ROEMELE.

JESSE HILL CROUCH, M.D.,* has been appointed Health Officer of Henrico County, Va., succeeding DR. J. D. HAMMER, JR.

DR. OLIVER W. JENKINS, of Edison, Ga., has been named Health Officer of Terrell County, succeeding DR. CLAIR A. HENDERSON, of Dawson.

DR. HARDY A. KEMP, Professor of Bacteriology and Preventive Medicine at Baylor University College of Medicine, Dallas, Tex., has been appointed Dean of the University of

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* Fellow A.P.H.A.
† Member A.P.H.A.

Vermont College of Medicine, succeeding DR. JAMES N. JENNE, deceased.

JOSEPH AUGUSTIN LE PRINCE, Senior Sanitary Engineer, U. S. Public Health Service, Washington, D. C., retired September 1, after 25 years of continuous service.

DR. ALBERT G. LE ROY, of Lyons, Ga., resigned as Health Commissioner of Toombs County, effective September 25, to accept a similar position in Tift County, succeeding ROBERT H. HARALSON, M.D.,† of Tifton, who plans to engage in private practice in Calderwood, Tenn.

DR. JAMES H. LITTON, of Carbon, W. Va., has been appointed Commissioner of Health for Baldwin County Ga., succeeding DR. STUART P. VANDIVIERE, of Milledgeville.

DR. JACK R. MCMICHAEL, of Quitman, Ga., has been appointed a member of the Georgia State Board of Health.

DR. JAMES W. MILLER, of Greensburg, Ky., has resigned as Director of the Green County Medical Society to enter private practice.

DR. ROBERT C. PENDERGRASS has been appointed Director of a newly organized cancer clinic in Americus, Ga.

DR. SOLOMON P. ROBERTS, of Nowata, Okla., has been appointed Health Officer of Nowata County.

DR. EVERETT W. RYAN, of Canton, Miss., formerly Director of the Madison County Health Unit, has been transferred to Charleston to direct the Tallahatchie Department.

DR. ELMER R. SCHNAKE, of Newport, has been appointed Health Officer of Newport, Ky.

DR. STUART P. VANDIVIERE, formerly Commissioner of Health in Dodge County, Ga., has been appointed Commissioner of Health for Sumter County, succeeding DR. WILLIAM F. CASTELLOW, of Americus.

JAMES P. WARD, M.D.,† of Charleston, Miss., Director of Tallahatchie County, was appointed Director of the Washington County Health Department, effective October 15, succeeding DR. BENJAMIN F. HAND, JR., who resigned to engage in private practice in Greenville.

Western States

THOMAS H. BIGGS, M.D.,† of Chehalis, Wash., has been appointed District Health Officer for Grant and Douglas Counties, in Oregon.

DR. HENRY RUSSELL BROWN, of Watertown, S. Dak., was elected President of the South Dakota Health Officers Association at the meeting in October.

DR. WALTER W. BROWN, of Hardy, Ark., has been appointed Health Officer of Sharp County.

DR. JAMES F. HAYS, formerly of Augusta, Ark., Health Officer of Woodruff County, has been placed in charge of the health unit in Pope County, with headquarters in Russellville.

DR. ULYS JACKSON, formerly of Marshall, Ark., has been assigned as Health Officer of Boone County, with headquarters in Harrison.

DR. ALVA S. PINTO, of Omaha, Neb., has been appointed Health Officer of Omaha, to succeed DR. FLOYD H. KINYOUN, resigned.

DR. JOHN B. PORTER, formerly of Omaha, Neb., has been appointed Health Officer for Kitsap County, to succeed DR. THOMAS C. BALDWIN, of Port Orchard.

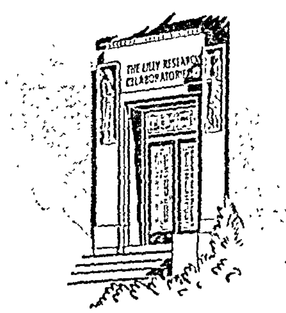
DR. WILLIAM J. QUINN † has resigned as Health Officer of Eureka, Calif., to accept a similar position with Humboldt County.

DR. ALVIE B. TATE, of Russellville, Ark., Health Officer in Pope County, will go to Woodruff County.

* Fellow A.P.H.A.
† Member A.P.H.A.

CONFERENCES AND DATES

American Association of School Administrators. St. Louis, Mo. February 24–29.
American Association of Social Workers (Delegate Conference). Grand Rapids, Mich. May, 1940.
American Congress on Industrial Health. Chicago, Ill. January 15–16.
American Library Association. Cincinnati, Ohio. May 26–June 1.
American Medical Association — 91st Annual Meeting. New York, N. Y. June 10–14.
American Orthopsychiatric Association —17th Annual Meeting. Hotel Statler, Boston, Mass. February 22–24.
American Public Health Association —69th Annual Meeting. Book-Cadillac Hotel, Statler Hotel, Detroit, Mich. October 8–11.
American Scientific Congress—8th. In connection with celebration of 50th Anniversary of founding of the Pan American Union. Washington, D. C. May 10–18.
American Society of Civil Engineers. Annual Meeting, New York, N. Y., January 17–19; Spring Meeting, Kansas City, Mo., April 17–19.
American Water Works Association. Kansas City, Mo. April 21–25.
Convention for the Revision of the Pharmacopoeia of the United States. Washington, D. C. May 14.
Council on Medical Education and Hospitals of the American Medical Association—36th Annual Congress. Federation of State Medical Boards of the United States will participate. Palmer House, Chicago, Ill. February 12–13.
Greater New York Safety Congress—Meeting with the Safety Congress. April, 1940.
Industrial Health — Second Annual Congress. Sponsored by the American Medical Association. Palmer House, Chicago, Ill. January 15–16.
International College of Surgeons—United States Chapter. 4th Annual Assembly. Venice, Fla. February 11–14.
International Heating and Ventilating Exposition—Sixth. Under auspices of the American Society of Heating and Ventilating Engineers, and coinciding with its 46th Annual Meeting. Lakeside Hall, Cleveland, Ohio. January 22–26.
Massachusetts Public Health Association. Golden Anniversary Meeting. Parker House, Boston, Mass. January 27.
Michigan Public Health Association. Detroit, Mich. October, 1940.
Mother's Day. May 12. Tenth annual nationwide campaign to make maternity safe—Maternity Center Association, New York.
National Conference of Social Work. Grand Rapids, Mich. May 26–June 1.
National Public Housing Conference. Washington, D. C. January 26–28.
National Social Hygiene Day—4th Annual Observance. February 1.
National Warm Air Heating and Air Conditioning Association. Cleveland, Ohio. January 22–26.
Pan American Union. Celebration of the Fiftieth Anniversary. Washington, D. C. April 14.
Smoke Prevention Association — 34th Annual Convention. Hotel Statler, St. Louis, Mo. May 21–24.
Southern California Public Health Association. Long Beach, Calif. January 24.
White House Conference on Children in a Democracy. Washington, D. C. January 18–20.



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CONTENTS

Continued on page vi

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Continued on page viii

Contents—Continued

INDEX TO ADVERTISERS

American Journal of Public Health
and THE NATION'S HEALTH

Volume 30 February, 1940 Number 2

A Personnel Education Program in the Department of Health*

LEONA BAUMGARTNER, M.D., Ph.D.

Director of Public Health Training, Department of Health, New York, N. Y.

TRAINING for service in public health has expanded enormously in the past 4 years. The very term "in-service" training is relatively new to public health. It, therefore, seems appropriate to report, for the benefit of those who are faced with the planning of training programs, the experience of a project in the New York City Department of Health which has for the past 2½ years attempted a fairly extensive program of in-service training for its employees. Moreover, the educational experience gained in conducting an in-service training program may be of value to those persons in academic institutions who are building curricula for students of public health.

BACKGROUNDS FOR STAFF EDUCATION

The success of any organization is dependent not only upon progressive leadership but on the qualifications, attitudes, and interests of all of the members of its staff. There has always been a natural tendency for employees long in service, particularly those in positions involving routine duties, to settle back in the harness, doing the day-to-day work but losing the drive and initiative often brought to a job by the newcomer who looks to the future. If a health department is to maintain its efficiency, deliberate steps must be taken to counteract the dullness of unchanging routine, to broaden horizons of interest, to re-instill the desire to mold the future, and to establish enthusiasms which mean a ready and willing acceptance of change when change means more effective work.

This is true of any large organization but particularly true of health departments. Public health in itself is hardly an independent science but one nurtured by many disciplines. Its foci of activity change from decade to decade, and the methods by which it attempts to reach the same objective may change even more frequently. It is imperative, therefore, for the administrator to have a flexible staff, one sensitive to changing

* Read at a Joint Session of the Health Officers and Public Health Education Sections of the American Public Health Association at the Sixty-eighth Annual Meeting in Pittsburgh, Pa., October 17, 1939.

conditions which may indicate the development of different procedures—a group which is willing and anxious to experiment with new technics instead of blindly following old patterns—a staff which grows with the times. Employees with potentialities for creative work are found in every organization but their enthusiasm often has been dulled and their talents crippled by traditional authority and routinized methods of work. A mere change in point of view may release energies and convert intrinsic talents to greater use.

It is common experience that an educational project may stir many employees to increased activity and development. But the administrator must choose the pattern which such a venture will take. Selecting a few persons for intensive training and trusting that the inspiration thus gained will act as leaven for all is a simple and often effective method of staff training. Organizing "refresher" or "short courses" in which many employees are rehearsed in the rudiments of their professions is another popular device. Or these "rehearsals" may be scheduled as a part of routine work, the administrator or the group choosing certain topics to be studied for the year and devoting a part of each regular staff meeting to them. Some organizations have also found it profitable to have a central staff to which responsibilities for staff education are delegated.

What to teach and how to teach it will be critical problems for every in-service training project. The alert administrator may know exactly what his staff needs but many useful suggestions come from staff members themselves. Certain educational leaders have found it useful to determine the desires and experiences as well as to secure the advice of each group for which any training activity is designed before the program for that group is planned. If the employee finds the problems which exist in his own work and assists in planning what he needs to solve those problems, the program of staff education is firmly rooted because it becomes a part of the employee's own thinking and activity.

There are other reasons why such a policy seems desirable. The public health program of today is less and less one of police control and more and more one of health service and education. To close an infected well is a different job from teaching a mother dietary hygiene, and demands a different approach. In the former it was possible to follow a rigid set of regulations but the latter demands that the public health worker secure the coöperation of his client in order to educate him. He, therefore, needs to use imagination and discrimination. Staff training, if effective today, must assist the employee in making such adjustments in his own approach to those he serves that he becomes a teacher and not a police officer. Group participation in the determination of objectives and methods of training is imperative in an educational program for employees who have been long in service.

Many times it is not technical training which an employee seeks but help in how to "put over" what he already knows. How can the nurse who knows the reasons for diphtheria immunization persuade a skeptical mother? How can the health officer preside more effectively over various kinds of meetings? What are the most useful kinds of reports from an investigation of a smoke nuisance?—from a visit to the home of a tuberculous patient? These are common problems of procedure which are in the day's work of the health department employee and an educational project must find ways of helping to meet them.

The New York City training project was begun under the direction of Dr. H. E. Kleinschmidt with a small cen-

tral educational staff whose duty it was to plan and execute an educational program with the assistance of the department's administrators. Many methods of staff training have been utilized. To describe them is impossible within the time limits prescribed and, moreover, those interested can refer to the more lengthy monograph which has just been prepared. Here I shall only comment on our methods of procedure and the conclusions we have reached concerning certain methods of training commonly employed.

The staff soon discovered that the department personnel could be divided into specific categories—central administrative staff, district health officers, physicians, x-ray technicians, nurses, statisticians, office workers, etc. The same type of assistance was often requested by small groups in more than one administrative unit. Statisticians, for example, were employed in 5 bureaus and had the same kinds of problems. Moreover, certain courses appealed to more than one group of specialists—group discussion leadership was equally applicable to supervisors of nurses and food inspectors. It was finally decided that to build a curriculum around the specific needs of small groups of employees was more profitable than expending energy on general courses in various branches of public health for large groups.

SPECIFIC OBJECTIVES OF THE STAFF TRAINING PROGRAM

In accord with the basic philosophy which has just been outlined, and in consideration of other problems which were found in the department, the objectives of the project were finally outlined by the educational staff as follows:

1. To encourage the professional advancement of certain employees through grants of scholarships and tuition fees which enable them to study in recognized universities or schools of public health.
2. To help broaden the horizons of selected administrators and technical workers through visits to departments and institutions outside of New York.
3. To encourage continuous study by employees by offering them courses conducted within the department, using department personnel for teaching when available, and drawing upon other leaders when necessary.
4. To set up experimental and teaching centers where departmental workers might coöperate in developing specialized services and in testing the effectiveness of routine procedures. These centers would ultimately be coördinated with the department's adopted plan of developing teaching centers in connection with local medical schools.
5. To arouse a greater appreciation of public health work among all employees of the department by acquainting them with outstanding problems of public health, as well as the purpose and function of their own department; and to develop an esprit de corps.
6. To find ways and means of discovering latent leadership in the department and to develop it in such a way that both the individual and the department profit.

FELLOWSHIPS AND SCHOLARSHIPS

Thanks to Social Security Funds, we probably have all had sufficient experience with sending employees away for a full year of postgraduate study, to realize that the chief problem with this method of training lies in the selection of the recipient of the fellowship. It is also an expensive process, but will continue to be an essential part of any training program.

Organizing special courses in local institutions has sometimes been a very satisfactory educational tool. Small groups of food and sanitary inspectors have had a special course in the fundamentals of sanitary science particularly adapted to their needs. For physicians working part-time in the department's tuberculosis diagnostic service a clinical course in the wards of Bellevue Hospital was developed. In sharp contrast to the success of this course was one developed for the medical staff working in child health stations. The point of view of the teaching staff trained in instructing private practitioners of pediatrics was not useful to our physicians working

in preventive pediatrics in department clinics with children from the homes of lowest economic level.

THE INTRAMURAL COURSE

A variety of intramural "in-service" training courses have been developed. In each instance the employee's administrative officers have agreed that the contemplated course was desirable and have often participated in presenting some phase of it. Many courses have been developed at the suggestion of the employees for whom they were conducted and no courses have been planned without the advice of the group concerned. Some have consisted of only a few sessions and others have continued throughout a year. More than 1,800 students have been enrolled—some in several courses, others in only one.

Instructors have been selected from department ranks, from medical schools, schools of social work, voluntary health agencies—anywhere that well recognized leaders in a given specialty could be found. We have found it necessary to spend some time with each instructor, telling him of the problems which department employees have suggested they want discussed in the prospective course. We have been surprised how often men well qualified in a given subject are, however, unaware of what a health department's limitations, problems, or needs may be. The strictly academic point of view of some able teachers has sometimes inhibited their usefulness.

Many kinds of courses have been given—"refresher" courses in infectious diseases, food chemistry, the interpretation of roentgenograms in children, methods of group discussion, public speaking, report writing, medical German for laboratory specialists, Spanish for nurses working in a Puerto Rican district, backgrounds in public health for statisticians, mycology, and so on—each course built up around the needs of a small group. A member of the Bronx Zoo staff talked on the care of laboratory animals for animal caretakers; a teacher from the telephone company traced inefficiencies of department telephone service and courtesy; Dr. Eduard G. Lindeman, well recognized leader in the field of social relationships, discussed the rôle of the public servant under present-day conditions with a group of food and sanitary inspectors, and at another time with a group of district health officers.

Sometimes members of the central educational staff have been solely responsible for instruction. The instructor in nutrition, for example, has worked with groups of about 15 nurses at a time and in a series of 3 to 6 conferences on the basic principles of nutrition, the most effective utilization of home relief allowances, thrift buying, low cost foods, and the national and religious dietary customs—all subjects pertinent to the everyday work of the public health nurse. Each group met in the local district where the nurses worked. The content was adapted to the group and was presented in terms of assisting the nurse to meet the nutritional problems she met in her families. It soon became evident that the physician too would need to understand something of food costs, for if he prescribed an expensive formula, the diet for the rest of the family was jeopardized. Therefore, a few sessions on food costs were introduced into the child health center teaching program, and certain mimeographed materials were prepared for distribution by the division administrator to the entire staff.

Evening classes in commercial subjects and public speaking were given at no expense to the department with the aid of the WPA Adult Education project. Medical dictation was stressed—even the food inspector brought in his daily report as his English lesson.

Another successful method of training was the exchange service developed with

local medical schools. Here the hospital pediatric department sent members of the staff out to work in baby health stations and our staff went into the outpatient clinics and wards of the teaching hospital. We feel strongly that a closer liaison between hospital and public health personnel is desirable, and by another means have attempted to promote interchange. For example, all physicians from health department prenatal clinics worked for a time under the direct supervision of leading obstetricians of the city Obstetric Advisory Council—and were then "approved" by the professional leaders in the community. At another time the County Medical Society arranged that a contagious disease hospital give bedside instruction to small groups of school physicians.

In general, it seems possible to draw a few conclusions on the subject of the special course. A course is successful and accepted by the employee only as long as it seems useful to him in his daily work. Valuable suggestions on content will come from the employee himself. The informal course with abundant opportunity for well guided discussion based on day-to-day problems is often more effective than the formal lecture course in which the same material may be presented. It is necessary to study carefully the backgrounds of the group to be served before instruction is begun. There are many sources in the community which may be tapped for valuable educational assistance.

THE TRAVEL FELLOWSHIP

We have had a limited experience in sending employees out to see others working at similar jobs. Certain administrative officers and laboratory experts have been sent, each to a specific center and usually for from one to two weeks. From this experience we have gained the following impressions of this method of training:

1. Visiting other health departments may be a valuable method of staff training but its use is limited.
2. The benefit derived will vary greatly with the individual sent.
3. The trip needs to be carefully planned before the traveller leaves. It is wise to visit only one center and one with problems similar to those the employee faces at home.
4. Sufficient leisure for close observation of details in the field is to be preferred to days crammed with interviews with many persons.
5. Technical workers probably benefit more than administrative officers.
6. Certain definite objectives should be outlined before the traveller leaves and a comprehensive written report should be required of him on his return. This should not be a chronological account of what was seen—but an evaluation which should bring out contrasts to and suggestions for the work at home.

TEACHING CENTERS

Perhaps the most valuable teaching technic used for improving the quality of service rendered in a particular branch of work has been the development of the teaching or experimental center. By this is meant a typical unit of service which can be used for teaching the employee while he is actually on the job. It has been found better to term this an "experimental" instead of a "teaching" center. The employee then comes to the center as a part of an experiment—an experiment in which the new methods and technics are being tested—an experiment in which he and the teacher both participate.

From our experience in three such teaching centers (child health, school health, and public health nursing) we feel that such a center is a valuable tool not only in teaching the employee but in developing improved routines for department service. It seems easier for a person employed to perform a given task to see the flaws in his own technic and in his approach to his work if he gets away from his own work bench. However, if what he is to learn is to have meaning he must be given a work bench and tools similar to those with which he is usually equipped, and must

be given freedom and leisure to experiment with them. If he can be made to feel that he is part of an important venture in which he may be a valuable cog in working out a new program he will probably drop old attitudes and look around for improved methods of solving his difficulties—and this, we feel, is a most important objective of in-service training.

GENERAL HEALTH EDUCATION FOR STAFF

It has been a part of the project's philosophy that to arouse an appreciation of public health among all the employees of the department and to acquaint them with department activities is a legitimate part of staff training. Each of our employees represents the department to his own circle of friends and to him are often referred questions of health. Is diphtheria immunization dangerous? Where can one get a Wassermann test? Do colds cause pneumonia? If well informed, he may become a useful health educator—but the department had never made any particular effort to instruct him. If everyone knew of department activities and objectives, there might also develop a greater esprit de corps and a better quality of work.

Three media were found useful. The first was a bi-weekly house organ, a single mimeographed sheet signed by the Commissioner, distributed with pay checks, carrying some message on public health to all employees. The second was the lunch-time meeting at headquarters — continuous programs each Thursday noon — so the employee could drop in for half of his lunch period for the exhibit, movie, discussion, demonstration, or lecture which was on the program. Interest in these popular programs developed rapidly, and in two winters there has been an attendance of 24,430. The package library, in which are duplicate sets of selected pamphlets or small books on various health topics, has also proved successful, but only when an active promotional campaign accompanies the release of each new library.

THE STAFF MEETING AS AN EDUCATIONAL TOOL

A common vehicle for staff education is the regular staff meeting. One member of the educational staff in the Bureau of Nursing* has made an extensive study of the staff conference and, having developed certain technics of observation, has come to conclusions concerning the use of the staff meeting in education or in the development of leadership. It must be noted that we have considered it a misnomer to call a meeting of field workers and their chairman a staff conference if the order of business includes merely the giving out of orders, distributions of supplies, or checking up on record-keeping discrepancies. Our experience in attempting to use the staff meeting as an educational tool has lead to these conclusions:

1. It is important that there be intensive and individual guidance in training those who will lead staff conferences.
2. The readiness of the individual for guidance is an important factor in determining the course of development and in judging the rapidity of improvement.
3. The individual's special needs and interests must be considered.
4. Continuous encouragement and constructive criticism are essential.
5. The staff first should become thoroughly familiar with some of the simpler practices of the discussion method before any attempt is made to give guidance in the more intangible skills of leadership, especially those that are dependent upon psychological insight.
6. The specific procedures most readily accepted and most successfully applied in our experience were:
    a. The use of an agenda
    b. The introduction of the topic for discussion with a concise review of the issues involved
    c. Summarizing the pertinent points at frequent intervals during the conference

* Miss Bertha Jenkins, to whom the author is indebted for these remarks.

d. Use of visual aids in presenting materials, such as Isotype charts, record forms, movies

7. The development of effective staff conferences is a difficult procedure but an effective method of training personnel.

ADMINISTRATIVE PROBLEMS

In any organization the problems of administrative management become increasingly important as the organization becomes larger. Moreover, there is an additional problem when professional personnel—doctors, engineers, architects—are concerned. Medical personnel in a health department, for example, need the active support of an intelligent and a flexible set of administrative policies if they are to produce a high quality of professional service and if they are to continue to grow in their profession. It is herein that a public service meets with difficulty. There would appear to be a kind of hardening of the administrative arteries in the public service that encourages stagnation. It sometimes seems as if more good physicians are lost to the cause of public health because of dissatisfaction with the professional conditions of their employment than because of the salaries available.

It, therefore, becomes important for any staff education project to be sensitive to those administrative procedures which discourage rather than encourage a high quality of service. It is probable that every educational project will be asked to assist with administrative problems, will uncover weak links in procedures, and be confronted with problems of personnel management. We have in some instances been able to base training programs on the results of detailed studies of administrative policies and have been unusually pleased with the results. And this year we are experimenting with another method of attacking this need for assistance in the administrative field. We have added to the central staff a specialist in public administration, hoping to discover what public health administration can learn from that specialty.

IN CONCLUSION

In conclusion, 2½ years of experience with an intensive program of in-service training for a municipal department of health has shown that there must be wide experimentation with various educational technics—and that a flexible program must be established. Much can be done to change attitudes and improve quality of service, but didactic methods seldom achieve these ends. The educational venture which attacks specific problems in department service in a realistic manner and which allows generously for employee and supervisor participation will not only be sought out by the employee but give greatest returns to the department.

TABLE 1

In-Service Training Courses Organized to Meet Specific Requests and Needs of Groups of Health Department Employees—January 1, 1937–June 30, 1939

Name of Course	*For Whom Designed*	*Description of Course*	*Instructors*	*Number of Sessions Held*	*Average Attendance per Session*	*Remarks*
New Advances in Infectious Diseases	Epidemiologists	Lectures on influenza, measles, pneumonia, rabies, amebic dysentery, diphtheria, poliomyelitis, meningococcic meningitis, tularemia, leprosy, epidemic diarrhea of the new-born, with adequate time for questions	Outstanding experts on each subject from New York City, U.S.P.H. Service, etc.	11	49	On employee's time. Some physicians of other bureaus also attended

TABLE 1—(Cont.)

Name of Course	*For Whom Designed*	*Description of Course*	*Instructors*	*Number of Sessions Held*	*Average Attendance per Session*	*Remarks*
Modern Problems in School Health	School physicians and health officers	Lectures and discussions on various pertinent topics, normal growth and development of school children, health education, child psychology, childhood tuberculosis, nutrition, endocrinology, cardiac and orthopedic problems, venereal disease, pneumonia	Department leaders and authorities on particular subjects from outside	26	175	Attendance on department time during school vacations. Planned partially to use up this time and to build morale. Supplemented by small group meetings as well
Newer Knowledge of Human Diseases Acquired Through Animals	Veterinarians	Lectures and discussions on trichinosis, anthrax, undulant fever, food poisoning, tularemia, and psittacosis	An outside expert	6	29	On employee's time
Interpretation of X-rays in Children	Physicians—particularly those in schools and child health stations	Lecture and practical clinics on X-rays in children	Training staff instructor and outside lecturer	12	10	On employee's time. Course of 4 sessions repeated 3 times
Obstetrics—A Refresher Course	Physicians in charge of prenatal clinics	Practical work in hospital prenatal clinics	Chief of hospital clinics selected by Advisory Obstetric Council	Depended on Trainee	7	Each physician to be trained worked in clinic until approved or rejected by its chief. Both employee and department contributed time
Contagious Diseases Refresher Course	School and child health physicians	Clinical bedside sessions in a contagious disease hospital	Hospital staff	6	67	On employee's time. Enrolled through County Medical Society
Pediatric Clinics	Physicians in child welfare clinics	An exchange of externe service in an academic pediatric out-patient department	Academic pediatric staff	1 month service	28	28 health department physicians spent 1 month each in academic departments. In summers, usually on department time
Modern Problems in Child Care	Physicians in child health stations	Lectures and discussions on infant diarrheas, behavior problems, normal infant growth and development	Experts — department and outside	4	79	On department time—vacation or Saturday Institute
Health Officers Seminars	District health officers	Seminars on epidemiology, maternal and child health, public relations, health education, and department administration	Experts from outside New York City, Schools of Public Health, and Department	11	25	On department time
Backgrounds for the Public Health Dentist	Dentists	Lectures and discussions on various phases of public health, dentistry, nutrition, child psychology and education	Department leaders and outside experts	29	80	Attendance voluntary, on employee's time. All lectures mimeographed

TABLE 1—(Cont.)

Name of Course	*For Whom Designed*	*Description of Course*	*Instructors*	*Number of Sessions Held*	*Average Attendance per Session*	*Remarks*
Bacteriology of Food and Water	Laboratory technicians	Lectures and discussions	Head of this division in the department	4	25	On employee's time
Chemistry of Food and Food Products	Laboratory technicians	Lectures, recitations, and demonstrations. Practical aspects of analyses used in food control.	Department expert	23	15	On employee's time
Care of Laboratory Animals	Animal keepers in laboratories	Lecture and discussion on feeding, ventilation and general care of certain animals	Expert from Bronx Zoo	1	15	On department time
Mycology	Laboratory technicians	Lectures and discussions	Dr. Fred D. Weidman, Univ. of Pennsylvania	5	75	On department time
New Advances in Immunology	Laboratory workers	Lectures and discussions	Outside specialists	10	100	On department time and part employee time
Statistics	Statistical clerks and laboratory workers and administrators	Lectures and discussions — divided into two classes depending on background	Instructors from school of public health	36	18	On own time, 2 hour sessions — advanced class 20 sessions, other class 16
Interpretation of Statistical Material	Nurses	A simple course in backgrounds of statistics and vital statistics	Outside specialist	16	8	On own time, 2 hour sessions
Rodent Control	Sanitary and food inspectors	Lectures followed by field trips with individuals or small groups	Expert from U.S.P.H. Service	30	48	Time varied with groups—on department time
Chart Making	Statistical clerks and employees making charts	Demonstrations and laboratory work with all students making a chart	Dr. J. H. Watkins, Yale School of Public Health	4	18	4 afternoons on department time
Public Relations	Health officers	Seminars as backgrounds of sociology and psychology that influence our public relations	Eduard Lindeman, School of Social Research	6	30	On department time
X-Ray Technics	X-ray technicians	Lectures, demonstrations, and laboratory exercises in X-ray technics. anatomy, physiology and physics useful to the X-ray technician	Department experts and outside leaders	30	40	Held in conjunction with the Society of Municipal Radiographers —on employee's time
Technics of Group Discussion Leadership	Supervisors of food and sanitary inspectors	Topic of discussion was "human relations in government service" and thereby the instructor demonstrated methods of leading group discussion	Eduard Lindeman, School of Social Research	6	20	Department contributed half, and employee half of time
Backgrounds in Public Health	Statistical clerks	General backgrounds of public health problems	Professors of public health, department leaders, training staff	16	22	Employee contributed half time, department half

TABLE 1—(Cont.)

Name of Course	*For Whom Designed*	*Description of Course*	*Instructors*	*Number of Sessions Held*	*Average Attendance per Session*	*Remarks*
Medical German	Laboratory technicians	Medical and scientific German beginners	WPA instructor	not recorded	not recorded	On employee's time
Spanish	Nurses working in Puerto Rican district	Sufficient speaking knowledge of Spanish to assist nurse in taking history, making home visits, etc.	WPA instructor	14	23	Employee contributes half time, department half
Principles of Nutrition	Nurses	Group discussions on principles of nutrition and family budgeting	Training staff expert	104	10	Does not include conference classes at Training Centers, Kips Bay
Orientation Course	Secretaries, stenographers and selected clerks newly appointed	Organization and objectives of the department, telephone courtesy, office management and informational service	Department experts and teachers from the telephone company	6	88	On department time. Three sessions repeated each year. First year an attempt was made to reach old employees. Second year, new employees
Voice Culture	Secretaries	Voice culture	Telephone company expert	3	46	Individual instruction and suggestion
English and Vocabulary Building *	Clerical staff, nurses, inspectors	Meanings of words necessary to build vocabulary for everyday use, medical usage, etc.	Adult Education Project (WPA)	92	126	Night sessions on employee's time. Meets in 4 sections
Report Writing and Advanced English Composition *	Food and sanitary inspectors, nurses and clerical	Writing effective reports, articles, letters	"	68	86	Night sessions on employee's time. Meets in 4 sections
Filing and Office Practice	Clerical	Modern filing systems; clerical and secretarial duties and office appliances	"	64	12	Night sessions on employee's time. Individual instruction
Typewriting *	Clerical staff	Graded classes for beginners as well as advanced students: Medical drill, statistical typing, stencil, etc.	"	166	37	Night sessions on employee's time. Meets in 4 sections
Civil Service Review *	Clerical staff	Civics, arithmetic, English, mental alertness	"	146	117	Night sessions on employee's time. Meets in 4 sections
Shorthand *	Clerical and others	Graded classes for beginners and advanced students in both Pitman and Gregg; medical dictation, speed work	"	352	124	Night sessions on employee's time. Meets in 8 sections
Business Arithmetic	Clerical staff	Theory and problems in business arithmetic as adapted to municipal service	Adult Education Project (WPA)	82	13	Night sessions on employee's time. Meets in 2 sections
Public Speaking	Physicians, nurses, administrators	Some theory, largely practice with individual criticism of delivery, etc.	" and private teacher	39	53	Night sessions of 2 hours each. Met in 5 sections

* Statistics for course include 2 semesters with courses repeated in each.

Method for Determining the Effect of Chemical Antisepsis on Phagocytosis*

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THE routine procedure for testing the germicidal power of a compound by noting its effect on staphylococci or *Eberthella typhosa* and comparing the results with those obtained with phenol on the same organisms definitely has its place in determining disinfectant action on non-living material. Although the phenol coefficient method indicates the greatest dilution of the test substance capable of killing the organism used, it gives no information concerning the toxicity of this dilution for living tissue. The effect of an antiseptic on body tissue is relatively of greater importance than the ability of that antiseptic to destroy living microörganisms.

The method for determining the efficiency of germicidal substances described by Salle,[1, 2] and his coworkers has opened up a new field of study which will be of great importance in the proper evaluation of antiseptics and related compounds. This method is based on a comparison of the killing power of the antiseptic for bacteria with its toxic action toward living embryonic tissue. By combining these two results an index described by the authors as a "toxicity index" may be obtained, and is defined as the ratio of the highest dilution of antiseptic which prevents the growth of embryonic chick heart tissue during 48 hours to the dilution which kills a given test organism in 10 minutes. Theoretically, the smaller the index the more satisfactory the antiseptic. Salle demonstrated in tests on nine germicides that iodine (Lugol's solution) had the lowest toxicity index and mercurochrome and merthiolate the highest.

More recently Bronfenbrenner[3] and his associates described a "Manometric Method" for evaluation of germicides. The authors compare the effect of certain germicides on the oxygen consumption of adult mouse liver cells and of suspensions of *Escherichia coli* to which comparable amounts of protein in the form of horse serum have been added. The depressant effect on the rate of oxygen consumption in glucose-succinate buffer is taken as a measure of destructive action in both cases. Concentrations of disinfectant giving 50 per cent inhibition of the rate of oxygen uptake by *Escherichia coli* divided by the concentration giving 50 per cent inhibition of the rate of oxygen uptake by mouse liver cells results in a "toxicity index."

Both of the above methods focus attention on the proper evaluation of germicidal substances for antiseptic use but neither fulfils the desired require-

* Read before the Laboratory Section of the American Public Health Association at the Sixty-eighth Annual Meeting in Pittsburgh, Pa., October 18, 1939.

ments of simplicity and ease of manipulation necessary for the routine testing of such compounds. It seems desirable also in determining the toxicity of antiseptics that the tissue used be one closely associated with the protective mechanism of the body.

The mechanism of phagocytosis is an extremely important one in the protection of the host against invading organisms. In simple cutaneous lesions or infected wounds the leucocytes are the first line of defense. These cells not only phagocytize the invading organism after opsonization but as shown by Fleming [4] secrete a powerful bacteriolytic ferment (lysozyme) which acts directly on some bacteria. Fleming [5] further points out in discussing the bactericidal power of whole blood for the ordinary pyogenic bacteria that "the active agents in the destruction of these pyogenic microbes are the leucocytes, and if these are removed (as can be done by simple filtration through cotton wool) the whole of the bactericidal power of the blood is lost." The normal protective mechanisms of the body are only appreciated when we consider the many uneventful contacts that are made daily with potentially dangerous pathogens. Chemical antisepsis should only be used as an adjunct to the normal protective mechanism to augment the natural defenses of the infected host which have been partially broken down by the invading organisms. However, an antiseptic which destroys the normal function of the leucocyte can only have a deleterious effect on an important protective mechanism of the body.

The proposed method depends on the ability of the normal guinea pig or human leucocyte to engulf artificially opsonized staphylococci in the presence of increasing concentrations of the germicidal substances under test. All tests take place in the presence of 40 per cent fresh guinea pig blood.

METHOD

Guinea pig blood—Five cc. is withdrawn from the heart under ether anesthesia into 0.2 cc. of 20 per cent sodium citrate in isotonic salt solution, resulting in a final concentration of 0.78 per cent citrate. The blood should be used for testing purposes within 3 to 5 hours.

Antigen — Staphylococcus aureus (F.D.A. strain 209 *) is grown in Blake bottles on standard nutrient agar of pH 7.2 for 48 hours at 37° C. After checking each bottle for contamination, sufficient physiological salt solution is added to remove the bacterial growth by gentle rocking. Removal of the bacteria is facilitated if, after the salt solution is added, the bottles are placed flat on the bench and allowed to stand for 1 hour. The bacterial suspensions are pooled, measured, and an equal volume of fresh sterile 1 per cent chrome alum (chromium potassium sulphate) in isotonic salt solution is added. Ferric alum (iron ammonium sulphate) or gallotannic acid may be used. The treated suspension is incubated at 37° C. for 2–3 hours and then centrifuged to sediment the bacterial mass. The supernatant fluid is discarded and the bacterial mass washed twice with isotonic salt solution. The bacterial sediment is finally taken up in fresh salt solution using about 10 cc. to 0.4 cc. of bacterial sediment. This constitutes the stock antigen which can be used for at least 1 month. In the test the antigen should be diluted, as described by Feemster [6] and his coworkers, to give a corrected Gates reading of 1.04. This reading corresponds to a bacterial count on the order of 500 million staphylococci per cc. Since the degree of phagocytosis depends to a considerable extent on the

* This culture is maintained under carefully controlled conditions for antiseptic testing purposes in the Food and Drug Administration, Washington, D. C.

antigen concentration, it is necessary that the suspensions be carefully standardized.

Antiseptic—The antiseptic is diluted in isotonic (0.85 per cent) salt solution. The toxicity indices reported are based on the final dilution of the active ingredient of each germicide used.

TECHNIC OF TEST

The antiseptic dilutions are pipetted in 0.1 cc. amounts to the bottom of test tubes measuring 100 x 13 mm. (Wassermann tube). To the antiseptic is added 0.2 cc. of citrated (0.78 per cent) normal guinea pig blood followed by 0.2 cc. of standardized antigen suspension prepared as previously described. After addition of each of the latter two ingredients the tubes are shaken gently and finally stoppered with No. 00 rubber stoppers, which should be carefully treated with alkali and then neutralized to remove materials toxic for blood cells. The tubes containing mixtures of antiseptic, blood, and antigen are placed on a rotating machine in the 37° C. incubator (see Figure 1) and revolved at 4 revolutions per minute for 30 minutes. The rock-

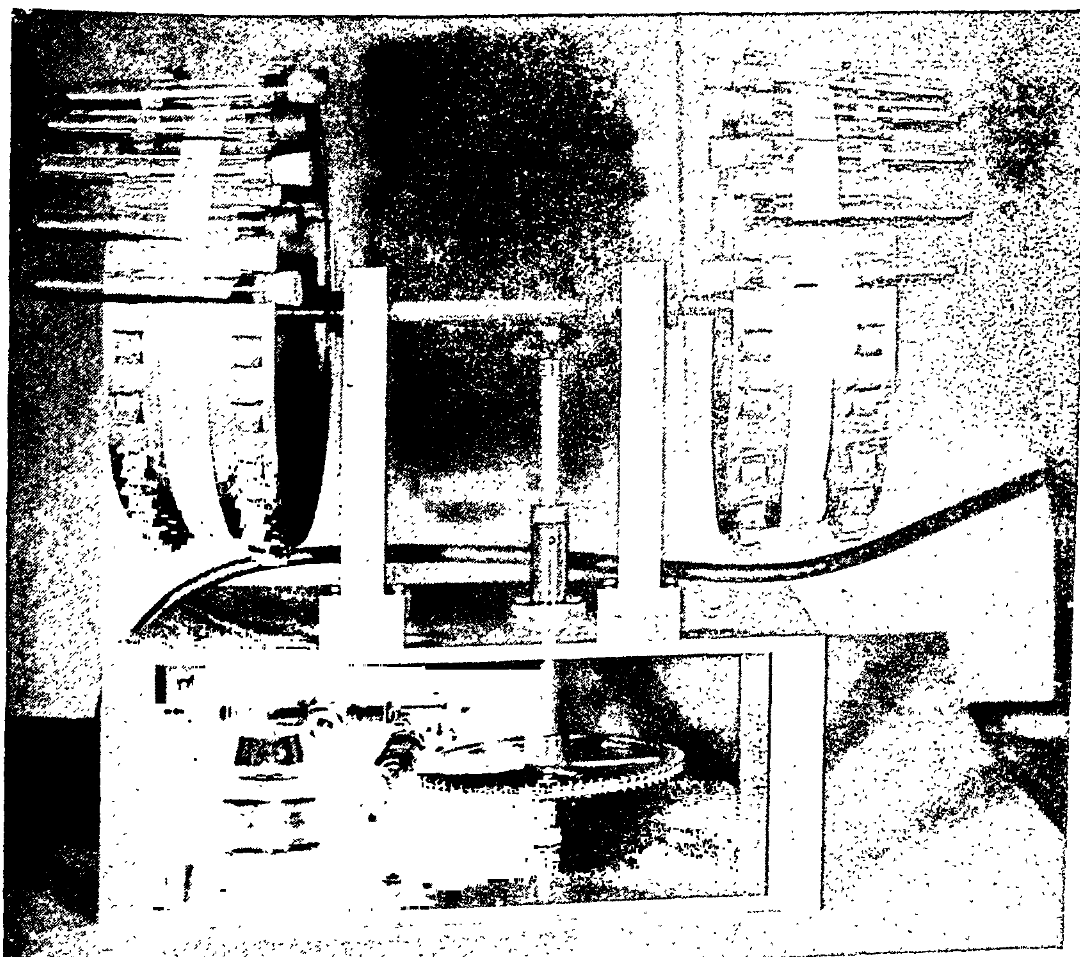

FIGURE 1

ROTATOR—Consists of 2 aluminum truncated cones which rotate at 4 r.p.m. by means of 2 bevel gears and a worm and gear (1:50 ratio). A rheostat is used to control speed further. The inner diameters of truncated cones are ½" greater than the outer, resulting in a slight incline of cone surface. The tubes are held in position by means of brass spring clips which are soldered directly to cone surface. The frame is made of duraluminum. The machine imparts a tilting and rotatory motion to the contents of the test tubes. The rotator is kept in a 37° C. incubator.

ing, rotating motion developed by this machine greatly increases the number of contacts between the staphylococci and leucocytes over that obtained by water bath incubation. The tubes are then removed, portions taken from each with capillary pipettes, and blood smears made in the usual way. The smears are made on glass slides (3″ x 1″) with small drops of material so that they terminate at about three-quarters the length of the slide. The slides should be thoroughly cleansed with a non-scratching cleansing agent and with alcohol before use. The smears should be dried rapidly by a warm current of air. An electric fan with a Bunsen burner placed a few inches behind it or an electric hair drier is satisfactory.

The smears are stained with 0.5 cc. of 1 per cent methylene blue in absolute methyl alcohol. After 1 minute, 1 cc. of distilled water buffered at pH 7.2 is added, and staining continued for 4 minutes longer. The slides are then washed carefully in running tap water, dried without blotting, and the number of staphylococci ingested by each of 25 leucocytes is estimated. Most of the leucocytes will be found at the margins and toward the end of the blood smear. Counts should not be attempted on dense clumps of leucocytes or those partially masked by bacterial aggregates. The degree of phagocytosis per cell is estimated as follows:

No phagocytosis—no organisms engulfed.
Slight phagocytosis—1–20 organisms engulfed.
Moderate phagocytosis—20–40 organisms engulfed.
Marked phagocytosis—Over 40 organisms engulfed.

As the concentration of antiseptic is increased the amount of phagocytosis decreases until a concentration is reached which completely inhibits phagocytic activity. This concentration (dilution of antiseptic) is referred to as the "toxic endpoint" of the antiseptic under test. Control tests are made with salt solution in place of antiseptic. From 40 to 80 per cent of the leucocytes in normal guinea pig blood markedly phagocytize artificially opsonized staphylococci depending on the concentration of the antigen used. By varying the concentration of staphylococci we were able to demonstrate that fluctuations of as much as 20 per cent "marked" phagocytosis

TABLE 1

Method of Test

1. Mixture: 0.1 cc. antiseptic
   0.2 cc. guinea pig blood
   0.2 cc. antigen
2. Rotated on mixing machine 30 minutes
3. Smears prepared and stained with methylene blue for 5 minutes
4. Degree of phagocytosis estimated

Toxicity of Mercurochrome

Final Contraception of Antiseptic	*Degree of Phagocytosis*			
	Negative Per cent	*Slight* Per cent	*Moderate* Per cent	*Marked* Per cent
0	24	10	14	52
1:1,500	100	0	0	0
1:1,600	100	0	0	0
1:1,700	100	0	0	0
1:1,800	100	0	0	0
1:1,900 *	100	0	0	0
1:2,000	80	16	4	0
1:2,300	68	8	8	16
1:2,600	44	20	16	20
1:2,900	20	8	28	44

* Greatest dilution completely inhibiting phagocytosis (toxic endpoint) 1:1,900.

with normal guinea pig blood did not materially affect the "toxic endpoint" of antiseptics tested with these different antigen densities.

The following protocol illustrates the technic of the test and gives the results obtained on one of the common germicides:

A method for evaluating antiseptics for chemotherapeutic purposes should approach as nearly as possible the actual conditions of use in or on the human body. Accordingly, the "toxic endpoints" of 10 common antiseptics in guinea pig blood were compared with those in human blood from 8 individuals. The method used was that described in Table 1 except that fresh human blood was used in place of guinea pig blood.

TABLE 2

Toxicity of Antiseptics for Human and Guinea Pig Leucocytes

	Dilution Showing Complete Inhibition of Phagocytosis	
Germicide	*Human Leucocytes*	*Guinea Pig Leucocytes*
Iodine (Lugol's)	1:600 *	1:1,200 *
Iodine (Tincture)	1:600 *	1:1,200 *
Metaphen	1:1,500	1:2,900
Hexylresorcinol	1:5,000	1:5,500
Pot. Mer. Iodide	1:1,000	1:1,000
Mercuric Chloride	1:1,300	1:1,600
Metaphen (Tincture)	1:5,400	1:5,500
Phenol	1:400	1:500
Merthiolate	1:17,000	1:24,000
Mercurochrome	1:1,700	1:1,900

* Final concentration of I_2

In Table 2 is given the average highest dilutions of 10 antiseptics which destroy the mechanism of the action of both guinea pig and human leucocytes. It will be noted that in all but one, greater concentrations of antiseptics were necessary to inhibit completely the phagocytic activity of the human cell. Potassium mercuric iodide was the only substance tested to which the guinea pig leucocytes showed a resistance equal to that of human cells. The greater resistance of the human cell is particularly noticeable with iodine (from tincture or Lugol's) and metaphen. A 1:600 dilution I_2 and a 1:1,500 dilution of metaphen were necessary to inhibit completely phagocytosis of human cells, while a 1:1,200 dilution of I_2 and a 1:2,900 dilution of metaphen brought about the same result with guinea pig leucocytes. In Figure 2 are photomicrographs showing the effect produced by certain dilutions of phenol and mercuric chloride on the phagocytosis of artificially opsonized staphylococci. To determine the toxicity of the antiseptics listed in Table 2 for bacteria the following method was developed:

METHOD FOR DETERMINING GERMICIDAL ACTION

Guinea pigs are bled aseptically from the heart (5 cc.) under ether anesthesia into 0.8 cc. citrate (20 per cent) in isotonic salt solution. Each 5 cc. of blood is then diluted up to 20 cc. with physiological salt solution (1:4). Final concentration of citrate is 0.78 per cent. The diluted blood is then infected with a 22–26 hour broth culture of *Staphylococcus aureus* (F.D.A. strain No. 209) so that each 0.2 cc. of blood is infected with 0.1 cc. of broth culture. The infected blood is distributed into Wassermann tubes 0.3 cc. per tube and brought up to 37° C. in the water bath. The chemical under test is diluted in sterile salt solution, brought up to 37° C. in the water bath and 0.2 cc. of each dilution added to the tubes containing infected blood. The final concentration of whole blood is 10 per cent. After a 30 minute interval a 4 mm. loopful is removed from each tube containing the infected blood antiseptic mixture and transferred to tubes

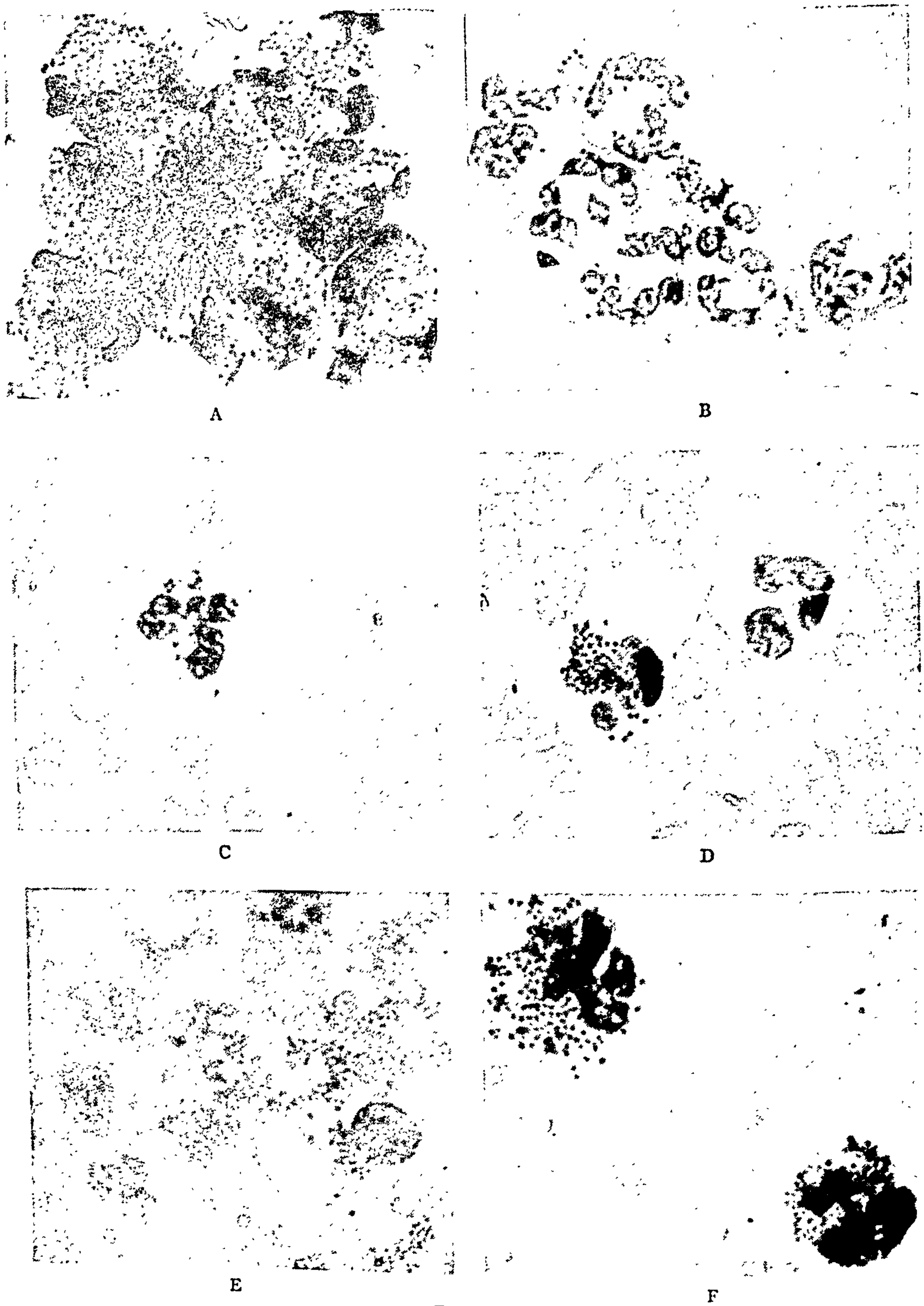

FIGURE 2

A Control: With no antiseptic present in system, leucocytes showed marked phagocytic activity of artificially opsonized staphylococci.

B Phenol in a 1:500 dilution (guinea pig blood) completely inhibits phagocytosis.

C Cell showing slight phagocytic activity. From system containing 1:600 dilution of phenol.

D A negative cell and one showing marked phagocytosis from system containing 1:700 dilution of phenol.

E Absence of phagocytosis in presence of a 1:1,500 dilution of mercuric chloride.

F Two cells showing marked phagocytic activity from system containing a *1:7,000 Mercuric Chloride.*

containing 10 cc. volumes of broth. The broth is that described by Ruehle and Brewer [7] for use in testing antiseptics and disinfectants. To reduce bacteriostatic effect, a second broth tube is then inoculated from the first with four 4 mm. loopfuls. The broth tubes are examined for growth at 24 and 48 hour intervals.

The toxicity for bacteria of 10 antiseptics has been tested by the above method. An average of 8 determinations made on each is given in Table 3. Following Salle's [1–2] method of computing the "toxicity index," *i.e.*, dividing the highest dilution of antiseptic toxic for tissue by the highest dilution capable of killing the test organism, the toxicity indices have been computed for each and are included in Table 3.

It will be noted that the toxicity indices of iodine from either Lugol's solution or from tincture were the same, 0.79 for human cells and 1.58 for guinea pig cells. This is due to the fact that the indices were computed on the basis of the actual concentration of iodine in these solutions. Since Lugol's solution contains 5 gm. of iodine per 100 cc. of water the actual dilution of Lugol's may be obtained by dividing the "toxic endpoints" obtained by 20. Correspondingly, since tincture of iodine contains 7 gm. per 100 cc. alcohol, the actual dilution of the tincture may be obtained by dividing the toxic endpoint by 14.3. The highest dilution of Lugol's solution which inhibits the phagocytic activity of guinea pig cells, therefore, is 1:60, while that of tincture of iodine is 1:84.

Even though the human were more resistant than the guinea pig leucocytes to the action of 9 of the 10 chemicals used, the relative efficiency of these compounds falls into the same order, regardless of the blood used in the test. In spite of the marked differences in technic used by Salle and his coworkers and the method reported herein, certain points of similarity in results were obtained. Salle and his coworkers demonstrated that iodine (Lugol's solution) was the best of 9 germicides tested, while phenol merthiolate and mercurochrome were found to be the poorest. By the technic reported in these studies similar results were obtained. While iodine (Lugol's solution

TABLE 3

Toxicity Indices of Ten Germicides with Human and Guinea Pig Blood

Germicide	*Highest Dilution Causing Inhibition of Phagocytosis* A *Human*	B *Guinea Pig*	*Highest Dilution Bactericidal for Staphylococci* C	*Toxicity Index* *Human* A/C	*Guinea Pig* B/C
Iodine (Lugol's)	1:600 *	1:1,200 *	1:760 *	0.79	1.58
Iodine (Tincture)	1:600 *	1:1,200 *	1:760 *	0.79	1.58
Metaphen	1:1,500	1:2,900	1:1,790	0.84	1.62
Hexylresorcinol	1:5,000	1:5,500	1:2,580	1.93	2.13
Pot. Mer. Iodide	1:1,000	1:1,000	1:460	2.17	2.17
Mercuric Chloride	1:1,300	1:1,600	1:540	2.40	2.96
Metaphen (Tincture)	1:5,400	1:5,500	1:1,715	3.14	3.20
Phenol	1:400	1:500	1:100	4.0	5.0
Merthiolate	1:17,000	1:24,000	1:2,980	5.70	8.05
Mercurochrome	1:1,700	1:1,900	1:58	29.31	32.75

* Concentration of I_2

or tincture) was 0.79 as toxic for the human cells as it was for staphylococci, phenol was 4 times, merthiolate 5.7 times, and mercurochrome 29.31 times more toxic for these cells than they were for staphylococci.

COMMENT

Normal blood has a definite bactericidal action which varies with the host and with the organism involved. The variation in bactericidal power due to different hosts depends on a number of factors including physical condition, previous history of disease, the opsonic power of the blood, the destructive action of the serum *per se*, and the number and efficiency of the leucocytes present. The variation in bactericidal power of the blood due to the type of organism differs widely with the species, the virulence, and number of organisms involved.

Since a part of the bactericidal power of the blood depends on phagocytosis, which in turn is dependent on the opsonic power of the blood serum, any decrease in opsonic power will result in a proportional decrease in the ability of the blood to destroy bacteria.

Fleming[3] in discussing the bactericidal power of blood points out that when a series of dilutions of phenol in salt solution are mixed with normal blood infected with staphylococci three definite zones of antiseptic activity can be demonstrated. In the control (no phenol) and in high dilutions of phenol (1:20,000) practically all of the staphylococci are destroyed, by the action of the blood itself; at a dilution of 1:640 phenol all the staphylococci survive (the bactericidal power of the blood is destroyed by this concentration of phenol), whereas at a dilution of 1:320 phenol all staphylococci are destroyed. Of these three zones of antiseptic action Fleming has called the 1st an *indifferent* zone, where no antiseptic action takes place on either leucocytes or bacteria, but the latter are destroyed by the bactericidal action of the blood; the 2nd an antileucocytic zone, where the antiseptic is toxic for the leucocytes but not for the bacteria; and the 3rd an antiseptic zone, where the antiseptic is toxic for both bacteria and leucocytes. The foregoing investigator has shown that all common antiseptics exhibit this phenomenon. It becomes obvious then that if an antiseptic destroys the function of the leucocyte much more readily than it kills bacteria there is little hope that it can act efficiently as a chemotherapeutic agent.

In the development of the proposed method an attempt has been made to approach as nearly as possible the conditions under which antiseptics are used. Whole fresh blood was chosen as a tissue since it is one of the germicidal agents of the body and as such should be assisted in its efforts to protect the host against invading organisms. By the use of artificially opsonized staphylococci, the degree of phagocytosis can be controlled within reasonable limits. Suspensions of treated staphylococci when standardized with the Feemster[6] modification of the Gates' apparatus maintain their uniformity for at least 1 month. The "corrected" Gates' reading is also valuable in the standardization of each newly prepared suspension. Considerable difficulty was encountered in attempts to standardize opsonins produced by animal injection while artificially opsonized staphylococci are quickly prepared and easily standardized. The test as described is simple to perform and does not require elaborate apparatus. The toxicity test may be carried out in the 37° C. water bath, although we have found the use of a rotating device which constantly mixes the blood, antiseptic, and artificially opsonized staphylococci gives somewhat more uniform results. Although the use of human blood in the

test rates the germicides in the same order as does guinea pig blood, the use of the latter appears at present to be the method of choice.

SUMMARY

A simple method is proposed for testing the toxicity of antiseptics using guinea pig or human blood as tissue.

The method is based on the complete inhibition by antiseptics of the phagocytosis of artificially opsonized staphylococci.

The toxicity and germicidal power of 10 germicides are reported. The "toxicity indices" were found to agree closely with those computed by Salle.

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The National Social Work Council

THE National Social Work Council is a conference body of national social work agencies associated for the purpose of exchanging information and studying common problems. The American Public Health Association is related to the Council by virtue of its membership in the National Health Council, which is one of the member agencies. Other health agencies directly identified with the National Social Work Council are the American National Red Cross, the American Social Hygiene Association, the National Organization for Public Health Nursing, the National Society for the Prevention of Blindness, and the National Tuberculosis Association.

The purpose of the Council as stated in its Constitution is to help national social work agencies, groups of such agencies and formal organizations of such agencies representing social interests, more readily to exchange information, to provide for regular conference between leaders and to provide through its committees for the investigation and study of problems common to all the agencies.

As to its methods, "the Council has no power to commit any national social work society to any course of action. Its influence and usefulness depend upon the wisdom of suggestions offered and the spirit in which they are offered. Education, it is believed, in the long run will carry further than any form of force. The delegates in a sense go to school to one another and are earnestly studying the most searching criticisms of the work of national social agencies. It is one of the few organizations not undertaking to do anything to anyone else."

Administration of Public Medical Service by Health Departments*

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TO persons not familiar with the varying points of view that obtain among members of the American Public Health Association it may seem odd that there should be any occasion for discussing the question at issue, namely: Who should administer tax-supported medical facilities and services? This is a simple question in governmental arrangement, and it is in no way concerned with current controversies relating to extension of public medical care or schemes of payment for professional services.

Substantial sums of money are now being made available through taxation for institutional care of the insane, the tuberculous, the physically handicapped, and for general medical service to the indigent and selected beneficiaries not in relief categories. Public officials, students of government, welfare workers, and practising physicians are in fairly substantial agreement to the effect that tax-supported functions that serve primarily health interests should be concentrated as far as possible in a single branch of government and be directed by a professional person of policy making rank. While not especially articulate on the point, the same groups perhaps would concede the health department to be the agency on whom administrative responsibility might appropriately rest. Public health workers, however, warily stand aside, fearful lest they be drafted for such duties. It is not uncommon for health officers, while admitting detached interest in medical affairs, to proclaim their lack of administrative competence. A few have gone so far as to appear before legislative bodies in opposition to the transfer of medical care services to health departments.

The matter of administrative responsibility for public medical service deserves most serious consideration, for on this decision may hinge the future welfare of the public health profession, and hence the preventive concept which it has espoused. Before a brief is presented supporting administration of medical services by health departments, some thought should be given to the inhibitions which deter health officers from accepting such responsibilities. Their attitude in large measure is closely related to the evolution of the public health program.

In former years, diseases accountable for most deaths gained wide prevalence either because of defects in scientific knowledge or disregard for personal and community hygiene of even the most elementary sort. Confronted with this state of affairs, it was incumbent on the health officer to give primary attention to such conditions as plague, typhus fever, yellow fever, malaria, typhoid

* Read at a General Session on Medical Care and the National Health Program of the American Public Health Association at the Sixty-eighth Annual Meeting in Pittsburgh, Pa., October 18, 1939.

fever, and the dysenteries; first, because these were major causes of death and, second, because their eradication was possible through rather simple procedures.

Striking conquests of disease during the past hundred years were readily attained by environmental control and mass education. There is a tendency to believe that maintenance of the ground gained is sufficient in the way of current accomplishment even though the maintenance of this static condition represents no particular effort. In this country at least, an esthetic sense and a desire for those conveniences commonly associated with sanitary devices serve automatically to insure continuance of measures necessary to hold in check most of the diseases previously mentioned. Furthermore, improvement in living conditions that usually goes with increased purchasing power among wage earners has brought about a lessening of the more serious nutritional disorders that arise out of privation.

It is the consensus of competent professional men today that the greatest opportunity for further improvement of the public health lies in the category of activity that is commonly classed as service to the individual. Of their own accord, the more progressive health departments for some time have been giving recognition to changing conditions as evidenced by their programs in immunization, diagnostic services for school children, care of the tuberculous, and hospitalization of persons with communicable diseases. More recently, largely through federal stimulation, attention has been focused on venereal diseases and the health problems associated with maternity and childhood. By and large, however, there has been no wide acceptance in public health circles of general medical care as a field for development. True, a few leaders of public health thought recognize the problem in an academic sort of way, but practical administrators as a group are disposed to regard the service as a commodity which the individual might purchase in proportion to his wishes and resources.

It is conceded even by those who are most reactionary that society has an obligation to meet the emergent needs of its dependent members. Health officers fear that a combination of public health services with medical care is certain to work to the detriment of the former. This of course is only speculation. There is no evidence to show that public health services of the traditional type fare better in departments without responsibility for medical service than in those with such encumbrances. Furthermore, the rapid growth of hospitals and medical services under welfare departments and separate commissions attests to the fact that action will be taken in these areas of social service irrespective of sponsorship. This development has taken place in response to a popular demand and often without adequate professional guidance, largely because the health authorities refuse the function of management.

As matters now stand it is the appropriating authorities that decide how much shall be allotted respectively to traditional public health services and how much shall be expended for medical care. According to all principles of organization the health department would be in better position to determine this apportionment if it had charge of the several functions of government designed to serve the health interest in its broader sense.

Another and perhaps the most compelling cause for hesitancy on the part of health officers to accept responsibility in the field of medical care is fear of being stigmatized by association with so-called socialized medicine. The contention of health officers that public health service is for all the people carries with it the implication that medical

service, if operated by health departments, would at once be made free to every citizen. Such thinking obviously is not realistic. It is the low-income and dependent classes of the population that now form the clientele of health department clinics. Essentially the same group now constitutes the beneficiaries of public medical facilities.

One type or another of public health or medical provision may predominate according as the facilities are developed in particular communities. The notion that indigency must be the qualification necessary for participation in benefits where physicians are employed still prevails and there is little likelihood of either type of service being expanded to include self-sustaining groups of the population without a direct mandate from the people. In that event the beneficiaries will be defined through legal enactment rather than through any discretionary authority that may be exercised at the admitting office, thus removing eligibility from the field of controversy.

Even if one granted that all of the foregoing disadvantages might accrue to health departments from having accepted responsibility for the administration of medical care, the inherent opportunities for enlarged service to the community far outweigh any other consideration. In this way only can a health officer exploit all the possibilities for health promotion. It is understood that prevention of illness would be the first concern in a health program regardless of its content. As a second objective, those unfortunate individuals on whom sickness falls should be afforded every opportunity for recovery and restoration to former health. These purposes certainly are more easily accomplished when the health officer has at his command technics and facilities for performing service suited to the individual's requirements than under the present dispersion of authority.

As stated at the outset, this paper is not concerned with the wider distribution of good medical care, a subject on which the public is becoming especially articulate. Rather an attempt is being made to present the opportunities for bringing to recognized beneficiaries better service from existing facilities through operation by health departments. Good medical service has a preventive content of another type from that exhibited by immunization, for example. This perhaps is expressed best in a negative way. A poorly handled fracture may cause a worker to lose employment in an occupation for which he is especially prepared. An eye injury, unless treated promptly and skillfully, may cause loss of vision and reliance on pension for the blind as a source of income. Neglect of a circulatory disturbance or failure to recognize the condition in its incipiency often results in early disability, unemployment, and finally dependency.

Cancer is not a disease confined to senility as often supposed. A large percentage of deaths occur at a time of life when social and economic obligations of the individual are at a maximum. Especially is this statement true of cancer among women. Children thus deprived of their mothers often become dependent and therefore a direct burden on society. No longer may the health officers find refuge in the old dodge: " Our function is to prevent disease, not to cure it." As stated, disease prevention, even to the point of eradication, should always remain the goal of public health enterprise, but prevention today has many connotations. Now it is expected that disability both temporary and permanent should be lessened by any device which society can command.

Some of the apologists for limiting activities of health departments to programs of traditional content make the point that a complete job is not being done at the present time even within

this narrow range. As opposed to this viewpoint, evidence could easily be adduced to show that concentration of forces against these limited objectives is attained by neglecting other opportunities for greater achievement. The 10 major causes [1] of death in the order of occurrence are as follows:

Heart diseases
Cancer, all forms
Cerebral hemorrhage, arteriosclerosis, and high blood pressure
Pneumonia, all forms
Accidents
Nephritis, acute and chronic
Tuberculosis, all forms
Malformations and diseases of early infancy
Influenza
Diabetes mellitus

Only tuberculosis and the disorders associated with early infancy are recognized in health department programs of orthodox type. The causes of disability as measured by days absent from work or usual occupation are quite different from the causes of mortality. Again, if one should arbitrarily select 10 major causes [2] for inspection, the array in descending order of importance would be

Colds and bronchitis
Influenza and grippe
Accidents and injuries
Tonsillitis and laryngitis
Indigestion and other stomach disorders
Rheumatic disease
Confinement and miscarriages
Diseases of generative organs (nonvenereal)
Ear and mastoid diseases
Diarrhea and enteritis

For many years health department programs skirted this group except diarrhea and enteritis. Largely through stimulation by the U. S. Children's Bureau, the hitherto neglected field of maternity seems destined to receive more and more attention. One must readily concede that many facts remain to be established before our knowledge can be considered satisfactory in respect to the causes of mortality and morbidity previously enumerated. On the other hand, measures for combating cancer, pneumonia, heart disease, and accidents, for example, are perhaps more effective than those now used against whooping cough, measles, poliomyelitis, and several other conditions on which a very large part of public health effort is spent.

The nature of ill health and its underlying causes might be pursued, but this is not the occasion for a lengthy discussion of the consequences of neglected illness or the humanitarian considerations which impel some provision for the relief of human suffering. Only a few generalizations can be made concerning the extent of tax-supported facilities and services now available, the opportunities for promoting public health through a better arrangement of available resources, and the suitability of health agencies for administering organized programs that serve the public health.

If health departments are to enlarge their interests in medical administration, the obvious first step is to assume greater participation in the management of functions now accepted as within the scope of public responsibility. Institutional care of the mentally afflicted is for all practical purposes a monopoly of government. Among nearly 600,000 beds of mental institutions in the Continental United States more than 500,000 are operated by federal, state, and local governments.[3] While field services in the interest of mental hygiene have not as yet attained significant proportions, mental institutions seem destined to be the centers from which such programs should develop. Health departments have not been identified to any appreciable extent with either the administration of mental institutions or the mental hygiene program. It seems doubtful if health departments can attain any stature in mental hygiene without first taking charge of the mental institutions.

While tuberculosis control was initiated by voluntary organizations, health departments at an early date recognized some responsibility in respect to case finding and field control measures. In contrast, however, a high proportion of sanatorium beds are not under direct control of health departments despite the fact that 80 per cent of such beds are in tax-supported institutions. As a result of this divided responsibility, it is difficult to bring about a proper integration of institutional and field services.

Relatively few people appreciate the fact that a very large medical service for self-supporting people has grown up through workmen's compensation. The insurance principle is used for spreading wage loss and the costs of medical care. While the benefits are geared for the most part to accidents arising out of employment the aggregate amount of care represents a money value of significant proportions. This social development occurred without intimate medical guidance and entirely beyond the ken of public health authorities. It requires no great amount of insight to appreciate the possibilities for promoting the health of workers through a closer association between health departments and compensation commissions than now exists.

The figures compiled annually by the American Medical Association show a steady and substantial increase in the number of general hospital beds under the control of state and local governments. These units of government operate nearly one-fourth of the beds in general hospitals. In addition to maintaining hospitals, governments contribute $32,000,000, or about 9.5 per cent of the income reported by voluntary hospitals.[4] While the number of out-patient departments attached to governmental hospitals is not so great as the number operating under voluntary auspices, proportionately more of the public hospitals operate such facilities. Like the sponsoring hospitals, governmentally operated out-patient departments tend to be larger than their voluntary counterparts. A study conducted by the U. S. Public Health Service in 1936 showed that 9,500,000, or 44 per cent, of the visits were made that year to out-patient departments of tax-supported general hospitals, as contrasted with 13,500,000, or 56 per cent, of the visits made to those under voluntary control.[5]

The volume of tax-supported medical service supplied directly by physicians in their offices and in the homes is difficult to express since the service is administered under a variety of auspices. Furthermore there is no regular provision for reporting to a central agency. The estimated public expenditure of $25,000,000 per annum for care of patients outside of hospitals,[6] shows very clearly that such service is of sufficient magnitude to arrest the attention of groups who should be interested in seeing that public services operate under competent professional direction. Despite the fact that medical care of needy persons has been recognized as a function of local governments since colonial days, the service as a rule is inadequate and poorly administered. The deplorable state of the home and office component may be attributed in large measure to the fact that tax-supported medical service usually operates without professional direction by a responsible public official. Meager though the sums appropriated by individual localities for such care may be, yet in the aggregate the expenditures for the nation as a whole represent a substantial amount. It is quite likely that appropriating authorities would be disposed toward greater liberality if good administration could be assured. Practising physicians no doubt would welcome impartial management by full-time health officers.

While the inadequacy of public pro-

visions for medical service of all types has become the theme for much discussion within recent years, strangely it is the magnitude of the expenditure for such service that causes health officers to avoid operating control. The estimated amount $130,000,000, used for the support of old-line public health service is dwarfed by $400,000,000 of tax money that now goes for the support of medical service including the care of persons in institutions.[6]

Arguments for and against participation by health departments in administration of medical care services could be pursued and perhaps with profit to the end that our views on the subject might be clarified. In a forum such as this, interest would perhaps hinge on the convenience of the health officer or the effect which the inclusion of medical care would have on his present program. From the standpoint of public administration such attitudes do not merit consideration. Those responsible for the arrangement of functions within the structure of government are concerned only with placement of responsibility where it can be discharged most satisfactorily to the interests of the taxpayer and of the beneficiary.

In closing, let us try to visualize a very practical situation that confronts public officials of a local political unit containing for example 50,000 inhabitants. The area maintains a small health department headed by a full-time medical officer. As assistants, there are employed another physician or two; a chief of sanitation, who may be an engineer, and several inspectors; a corps of public health nurses; one or more laboratory technicians; and the usual clerical force. The same community may operate a small tax-supported hospital; or, more than likely, care is purchased at local hospitals under voluntary control. Both the county physician system and a fee-for-service scheme have been tried for rendering home and office care to the indigent sick but neither plan has proved satisfactory. Altogether the area under consideration spends $50,000 of tax money or possibly more on public medical service of one type or another, in addition to the cost of maintaining clinics operated by the health department and persons in state institutions. Part of this fund is administered by the welfare department, another fraction directly by the county commissioner or city council, a substantial sum by a hospital board, and perhaps the county medical society has a mechanism for dividing among its members the amount paid for professional services. Neither the sponsors nor the consumers of service are exactly satisfied with the system or what might better be termed lack of system. Public officials, welfare authorities, and practitioners of the healing arts see the needs of sick people that remain unsatisfied and the wish to do more.

For an enlarged program they might find support among taxpayers if assurance could be given that the service and its administration would be made reasonably satisfactory. Under no circumstance, however, would the volume of such service be sufficient to justify the maintenance of a medical organization exclusively for its administration. In this area, please remember, there is a health department of average size and reasonable competence. It is the only publicly supported group of workers with medical and administrative experience; its leadership would be acceptable to public officials, welfare workers, the medical profession, and to the general public.

Public health workers in attendance at this convention, and especially those residing in places away from large urban centers, will recognize immediately that the situation described is typical of many areas even where an honest effort is being made to supply some reasonable measure of care. In those areas what

should the local health department do about administration of accepted tax-supported medical care? Does this Association have any advice to offer? It should be emphasized again that the question relates to "administration" of the medical care program and not actual care of patients by the executive health officer. Attempting to place responsibility on the doorstep of the county medical society is a subterfuge not deserving to be classed as artful side-stepping. It puts the onus for the present disorganized state of public medical service on a loosely knit society formed to serve the scientific and professional interests of its members. The acceptance of this challenge by the society would be equivalent to management of a public service by a guild with a vested interest. This of course would be contrary to recognized principles of public administration and is not likely to achieve any wide acceptance in our democratic society.

If the American Public Health Association and other professional groups have no further suggestions to offer, decision must be referred back to the people and their political leaders. We may rest assured that rather simple and direct steps will be taken, and it is entirely possible that the particular interests represented by the membership of this Association may become a subordinate consideration in a broad social program that features other issues.

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Quality of Medical Care Under a National Health Act*

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SENATE Bill S 1620, known as the Wagner Health Bill, provides "for the general welfare by enabling the several states to make more adequate provision for public health, prevention and control of disease, maternal and child health services, construction and maintenance of needed hospitals and health centers, care of the sick, disability insurance, and training of personnel. . . ." These objectives are noncontroversial. Representative consumer and professional organizations have expressed agreement with them. The Senate sub-committee appointed to consider the bill has reported that it "is convinced that Federal legislation along the general lines followed by S 1620, based upon Federal-State coöperative programs, is necessary to strengthen the health services of the Nation. . . ." It seems to be agreed that the planning and operation of health services are to be left to the local communities and states. The rôle of the federal government is to provide the states with financial and technical aid.

Physicians throughout the country, who have considered the Wagner Bill carefully and soberly (and there are some such) are apprehensive. They know that the appropriation and expenditure of federal moneys may of itself accomplish no useful purpose and may even do harm. They feel that the Wagner Bill places relatively too much emphasis on making federal moneys available to the states and too little emphasis on safeguarding high standards and economical service. They feel that the major concern of a federal health bill, which correctly leaves the operation of services to the states, should be the establishment of machinery and principles that will assure economy and efficiency in the appropriation and expenditure of federal funds. They know that good medical care today is so costly that the public cannot afford it, unless the greatest economy and efficiency is practised in its provision.

The American Medical Association, the Committee of Physicians for the improvement of medical care, and other professional groups appearing before the Senate sub-committee have proposed a unification of federal health services and authority under the bill. They are aware that certain compromises to conform with existing federal health machinery are advisable. For example, provision should be made for continuing and expanding federal health services of proved merit. But ultimtaely all such activities should be coördinated and merged into a general program. Simi-

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larly, within a reasonable length of time the health services of each state should be consolidated into a single state health agency. These compromises as regards time of unification can be made without jeopardizing the main objectives of the bill. But, to the vast majority of the medical profession, the divided control specified in the bill, as it now stands, is not compatible with economy and efficiency.

The unification of services and authority risks, of course, placing all the eggs in one basket. It is essential, therefore, that the central federal authority be properly constituted. Representatives of governmental agencies, as well as private groups, have recommended a single federal health council including both professional and public representatives. The Committee of Physicians feels that a federal health council should be more than advisory. It should be composed not of representatives but of leaders and experts. Since the Council's main purpose will be improving medical care and the standards of the institutions and individuals participating in this care, its problems will be largely professional. It should, therefore, be largely composed of physicians. It should be endowed with prestige and effective approving authority.

The Committee of Physicians has proposed the establishment of a General Health Council which shall have the power to define and supervise standards of medical care, education, and research for which grants-in-aid are appropriated. No grants shall be made without the Council's approval. With such veto authority, it can strengthen the position of the Chief Executive of the central administration agency—who, it is recommended, will be the Surgeon General of the U. S. Public Health Service. Remuneration of the Council's members must be generous enough to attract persons of the highest quality. In addition, scientific and technical sub-committees should be constituted under the authority of the Council to aid in its task of defining and supervising standards. In order to strengthen the position of the General Health Council in the interests of economy and better medical care, the Committee of Physicians has proposed that certain basic principles be incorporated in the bill. Among these are:

1. Hospitals or health centers must not be constructed to meet a temporary local condition in a manner or place that will not serve the ultimate purpose of a comprehensive program. They should not be constructed where existing public or private facilities are available or can be made available at reasonable cost.
2. Hospitals must be staffed by qualified physicians and surgeons and no person will be allowed to assume professional obligations for which he has not demonstrated competence. Every effort should be made to permit qualified physicians to participate in the activities of approved hospitals. Physicians should not be denied these facilities which are essential to good practice and the continued education of physicians.
3. An integrated program of health service and medical care should include: adequate public health and welfare services under competent control; the services of an individual physician, including office and home care; coördinated services of specialists and consultants; availability of modern diagnostic and therapeutic facilities, including hospitalization when needed.
4. The Federal Health Authority shall have the power to pass upon the adequacy of medical services available to beneficiaries under federally supported disability benefits.

And finally the Committee of Physicians feels that it is imperative that provisions be made in a special title of the bill for general medical education and research. Grants for these activities should be made by the General Health Council upon direct application from universities, other educational or research institutions and individual investigators.

Probably there are other means of strengthening the bill against the forces that will militate against it. If so, they

should be utilized. For, even with all these provisions written into the bill, two factors may prevent the attainment of the desired purposes. First, tradition, habit, sentiment, inertia, and vested interests will favor the application of our present individualistic fee-for-service practice to tax supported medicine. If this be done, federal moneys will be dissipated by paying the costs of an unorganized and uneconomical system of medical practice—a system in which physicians may do little or nothing to institute real economies in medical services; and in which overhead expenses proscribe a net income that is insufficient to enable most physicians adequately to keep abreast of the advances in their profession. Under such a system it is almost inevitable that the demand for appropriations will take precedence over concern for efficient organization. Extravagant appropriations may be made and spent, but the large government and charity hospitals of which we are so proud and upon which we are so dependent for introducing advances into medical practice will still be inefficiently organized and unable to afford the equipment and personnel which increase the efficiency of our private financially successful clinics.

Available experience shows that current individualistic medical practice and tax supported medicine are incompatible. It is one thing to have a patient pay a doctor for each visit or service rendered and a far different thing to have a third party make the payment. Where the patient pays or is under obligation, there is an automatic check on unnecessary and extravagant medicine. Where a third party pays, there is the opportunity of malingering or faking on the part of patients and of prolonging or exaggerating treatment on the part of physicians. The incompatibility of individualistic fee-for-service practice and tax supported medicine has long been recognized by the American Medical Association. Its desire to defend the former explains its past opposition to the latter. And yet state medical societies are ignoring this incompatibility. They are setting up various voluntary insurance schemes without any adequate coördinating or supervising administrative unit. Under these schemes the insurance premiums or subscription rates are to pay the costs of individualistic fee-for-service medicine. If the subscription rates are to be kept at a price the public can afford, fees will have to be slashed or services curtailed. In either case the quality of medical care will deteriorate. If the states should elect to provide tax supported medicine by such a system, the General Health Council or any other authority under a national health act would either have to permit an uneconomical use of public funds or have to refuse appropriations.

The second factor, that may prevent attaining better medical care under a national health bill, pertains to standards of cost. In the past the rich have paid the costs of medical care. They have not until recently been seriously concerned with economy. Under tax supported and voluntary insurance medicine, instead of the rich paying for the care of the poor, the healthy will support the medical care of the sick. Thus the base upon which the financial burden rests will be broadened. It will include people who cannot afford and will not bear the costs of uneconomical service. The demand for economical service will increase. The danger is that this demand may lower the price below that at which a decent quality of service can be provided.

The most practical way of meeting these two adverse factors is to provide medical services suited to the needs of tax supported medicine. Then standards of quality and costs applicable to tax supported medicine will be available. Today they are lacking. The crying

need today before legislation is enacted is an increase in the number of voluntary prepayment or insurance medical service groups properly organized in the interests of economy and efficiency and for the maintenance of a high quality of medical service. An increase in such services is, of course, important in so far as it would somewhat reduce the large number of persons of moderate income who cannot pay the current high costs of medical care and must under the present system be provided for by compulsory State plans. But the real importance in the establishment of such medical services is that they provide the experience and standards of cost and quality essential to sound State plans. It is to be regretted that the old bugbear of the illegality of the corporate practice of medicine can still be used by a highly organized group within the medical profession to impede the establishment of well organized medical services, for incorporation facilities the proper distribution of liability and the adequate financing of such organizations. Inadequate finances render difficult the centralization of offices, nurses, technicians, expensive laboratory equipment, and facilities essential to economy. They prevent operation on a scale large enough to assure that the subscribers represent a cross-section of society and thus a fair risk.

If only our large well equipped hospitals and their staffs of visiting and courtesy physicians would voluntarily organize to extend their services so as to supply complete medical care in the home, in the doctor's office and in the hospital! Given the good will of the physicians and the scrapping of the fee-for-service system of payment, executive committees of these units could meet the problems of an expanding hospital and home service, of an enlarging staff, of qualifications of specialists and consultants, and of methods of remunerating physicians by the central administrative offices. Such groups, well administered, would possess potentialities of supplying a high quality of medical care more economically and efficiently than can be envisaged as deriving from any other existing medical resources. The experience and the standards of quality and costs provided by such units would be of inestimable value in solving the problems of tax supported medicine.

In conclusion, let me summarize the two points I wish to emphasize. First, if a national health bill is to be written at all, it should be one that has some chance of attaining the desired ends, not one in which compromise at the inception has defeated them. Second, the lack of coördination, efficiency, and economy that is inherent in our present individualistic medical practice must not be carried into State tax supported medicine. To argue that it should, because the medicine we have today is better than that which we have had is irrelevant. We are concerned with the quality and cost of the medicine we shall have, when legislative enactments have given us tax supported medicine. The questions before us are: Must a system of providing medical care be used, which will make that care more costly and more inefficient than it is today? Or, faced with the reality that tax supported medicine is at hand, shall we insist that it be provided economically and efficiently? If we do, health and solvency may be had. One thing is certain—the one cannot be had without the other.

Practical Application of Industrial Exhaust Ventilation for the Control of Occupational Exposures*

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THE development of any type of engineering control for the protection of industrial health must be based on: (1) A specific job analysis of the operation or operations performed; (2) A study of operator technic; (3) Engineering and scientific data for developing control of the hazard involved.

To the layman there is no glamour to a drawing or an exhaust system, but to control engineers who, with the physician and chemist, form a tripod of attack for the protection of industrial health in the plants of this country, a properly designed and satisfactorily functioning exhaust system signifies something that is alive for it represents positive protection for the health of industrial workers.

FUMES AND ODORS

Certain industrial operations are productive of annoying and irritating fumes and odors. Among these may be mentioned acrolein which results from the decomposition of oil or materials containing oils or fats.

In the manufacture of strip copper, the billet, having been previously brought to proper rolling temperature in a preheating furnace, is carried to the roll table in front of the reducing rolls by means of an electric hoist suspended from an overhead monorail. It is then passed back and forth through the rolls to be reduced to the required gauge. The insides of the rolls are water-cooled. The surface of the rolls is swabbed with a special grease mixture to prevent the formation of scale or oxidation of the surface of the copper slab. In view of the fact that two operators are located directly in front of the roll table on the entering side or front of the rolls, one operator being located on the rear or leaving side, while a gauge operator on the side of the rolls regulates the roll displacement as the slab passes back and forth through the rolls, it was thought that the control of the dissemination of steam, flame, and large volumes of acrolein vapors could not be satisfactorily accomplished. This operation has been performed for many years without any control. As a result, the interior of the building structure directly above the rolls is covered with a hard deposit of carbonaceous material, which, aside

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from being unsightly, also presented a fire hazard. On days when the humidity was high or when doors and windows were closed during the winter, the heavy vapors dispersed throughout the entire shop area to the discomfort of all workers.

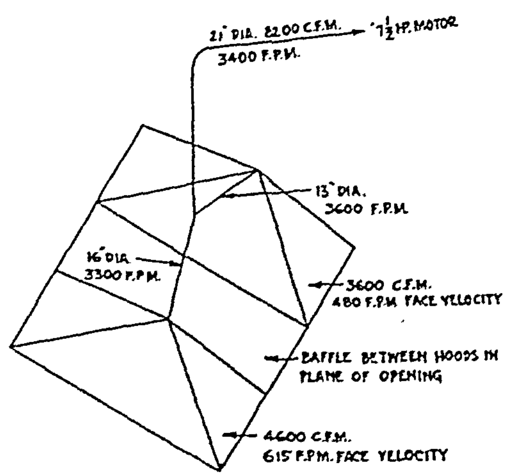
About a year ago an attempt was made to catch and exhaust these vapors. A sheet metal hood 7′ x 7′ was located directly over the rolls and about 12′ above the floor line, so as to clear all of the monorail structure. A 12″ dia. exhaust duct was connected to this hood and approximately 3,000–3,500 c.f.m. were exhausted. The original motor on the job was 7½ H.P. As soon as the system was operated it was found to be inadequate. The motor was changed to a 10 H.P. and then to a 20 H.P. with the hope that more air would be exhausted. Not realizing the relationship between fan performance and system characteristic, a point was soon reached where excess power was consumed without any additional effective control at the rolls.

The present installation is the result of a proper analysis of the various factors involved. The location of the preheating furnace relative to the rolls precluded any different method of billet handlings than that which is at present being used, i.e., the overhead monorail and chain-hoist is one controlling factor in the location of any exhaust hoods or ducts. To catch the steam, flame, and acrolein vapors effectively, any hoods must, of necessity, be close to the rolls. They could not extend very far forward or to the rear of the rolls due to the presence of the three operators. The front hood location was practically set as it could not come forward of the point where the hoist-chain was located when the billet was lowered to the roll slab. Again, hoods could not be dropped below the heads of the operators in front or rear of the rolls nor could panels be dropped on the sides of the hoods, for they would interfere with the vision of the gauge operator. Since most of the

FIGURE 1

Hot billet being sent through the roll—no vapor or steam in front of the hood

Arrangement schematically presented



irritating acrolein vapors from the rolls were generated in front as soon as the hot billet came in contact with the greased cool roll, more air was exhausted from the front hood. The arrangement is schematically presented in Figure 1 together with all of the air engineering data for the entire system. The result of the installation is shown in the picture taken just when a hot billet was being sent through the rolls. Not a whisp of vapor or steam rolls past the front edge of the hood.

The elimination of this exposure is based entirely on engineering control. The system calls for large air volumes and high face velocities at the lower face of the exhaust hoods, 615 f.p.m. and 450 f.p.m., respectively.

LEAD

An unusual lead exposure presented itself in the manufacture of an electrical specialty.

A call was received from the plant owner that some of his female employees were becoming ill. One of the girls had complained of severe abdominal pains.

The section of the plant where the trouble developed was a partitioned portion 26′ long x 13′ wide and 11′ high. One long and one short side contained movable steel sash. Three female and two male operators performed certain operations incident to the manufacture of these specialties. A survey of the work area and a cursory examination of the operators indicated a possible lead exposure, though the owner stated that as far as he knew, no lead of any kind was present in any of the materials used in the manufacture of his products. Samples of all the materials used in the process were obtained and analyzed by our chemists. One of the materials contained between 50 and 60 per cent lead, presumably as a borosilicate. The owner communicated with the manufacturer of this material and was informed that "it did contain a considerable amount of lead."

As a result of the first lead study which showed lead concentrations ranging from 7 to 15 mg./10 M^3 (7–15 mg. per 10 cu.m. of air), the following recommendations were transmitted with the report and thoroughly discussed with the management.

1. Bottles of drinking water and milk should be removed from the work area. When workers require water they should be supplied with paper cups or a bubbler fountain should be provided and located outside the work area.
2. Candy, chewing-gum, or food of any kind should not be eaten in the work area.
3. An inclined tumbling barrel wherein the ingredients were mixed should be removed from the work area and placed in an isolated enclosure, said enclosure to be provided with a propeller fan for general ventilation.
4. The operator working in the area wherein the tumbling barrel is located, should be provided with and use a respirator approved for protection against the inhalation of lead dust.
5. Specific recommendations were outlined covering changed technic in the mixing, dumping, and storage of the mixed materials.
6. Female operator technic of flipping flannel cloths against legs of the supporting table to remove excess material dropped from the specialties during their progress in the work area should be immediately stopped. This operation alone was found to contribute considerable dust and lead to the general work area. These cloths were found necessary to protect the chrome-plated surface of the specialties from becoming scratched.
7. No cleaning of any kind should be performed during working hours—especially dry brushing of the work tables—but preferably after working hours and by an operator protected with an approved lead dust respirator. A small portable vacuum cleaner would be a desirable piece of equipment for this purpose.
8. The solid metal top of the 14′ long x 18″ wide work table should be provided with screen or grille sections at the operator stations, each grille section to be located over a hopper and each hopper to be connected to a main exhaust system to discharge outdoors to a dust collector.
9. Previous to any ventilation installation, and after the tumbling barrel has been removed, ceiling, walls, floor, windows, and

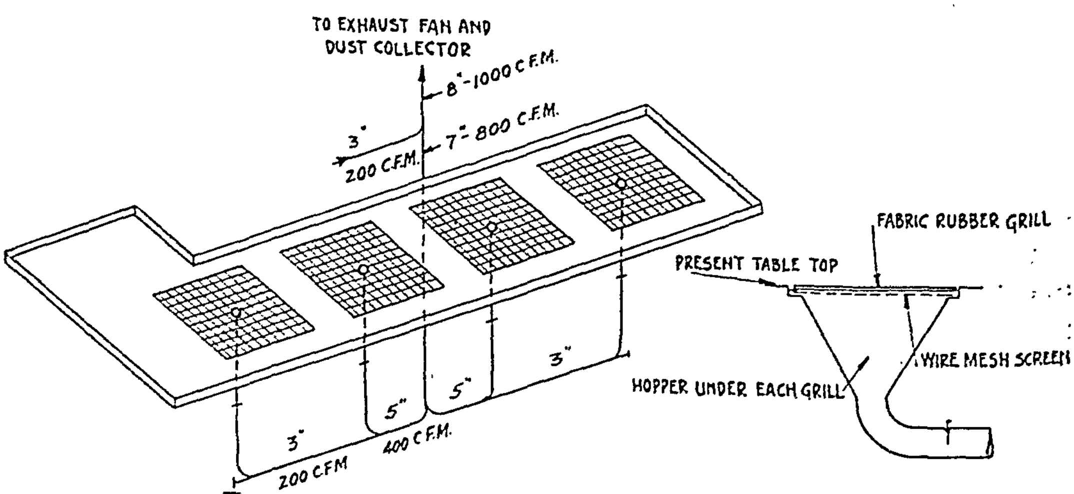
work tables should be thoroughly flushed with water to remove all present dust deposits.

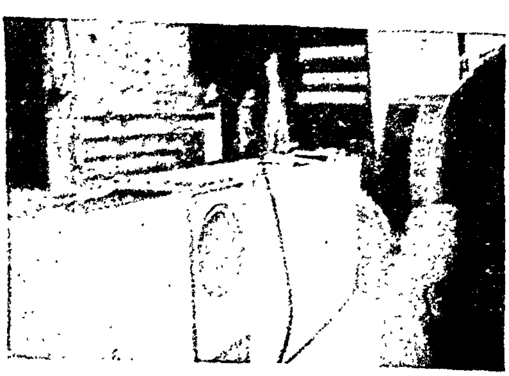
Recommendations 1, 2, 3, 4, 5, 7, and 9 were immediately complied with. Suggestion 8 is schematically illustrated in the upper portion of Figure 2. At each working position a rubber covered grille about 18″ x 10″ is set into depressions in the working face of the table as shown in the upper right-hand section of the sketch. Each grille is to handle about 200 c.f.m. at a net face velocity through the openings of 100 f.p.m., and a fan unit is to provide 800–1,000 c.f.m. exhaust capacity. Duct velocities averaged about 3,000 f.p.m.

The first attempt by the management is shown at "A" and "B." The solid top of the table was replaced by a heavy wire mesh set between the angle iron edges of the table. On top of this mesh were placed small fabric-rubber mats. Canvas curtains were placed along the front of the table down to the floor. At each work station, though not shown in either of these illustrations, inclined solid metal trays extended from the under side of the mesh grille to tote-boxes on the floor. These were to catch any material dropped through the grille top from the specialties as they progressed from operation to operation along the top of the table. About half way along the length of the table a

FIGURE 2

Schematic arrangement for down draft ventilated table—"A" and "B," front and rear views of attempted control





"A"

"B"

metal panel was located, containing a 12" dia. copper reflector, salvaged from a reflector-type bathroom heater. The inside of the reflector was connected to a 6" dia. inlet of a small direct-connected fan unit operated by a 1/8 H.P., 1,740 r.p.m. motor. The 3" dia. outlet of the fan was located inside a 6" dia. stove-pipe, shown at "B." This pipe extended through a hole in the building wall to the outside. Neither trap nor collector was connected to the end of this pipe. The idea of the reflector and fan installation was for the operators to flip their flannel cloths against the grille in front of the reflector so that all the dust would be immediately exhausted outdoors. When not so used, the fan was supposed to aid materially in purging the general work area of lead dust.

From an engineering standpoint, the installation was entirely psychological and typical of many industrial exhaust installations operating today.

After these changes, a second dust study was made, sampling points being the same as in the first study. Atmospheric lead concentrations ranged from 4 to 5.5 mg./10 M^3. This was a considerable reduction from the 7 to 15 mg. range of the first study. The reduction in concentration is to be attributed to the removal of the inclined tumbling barrel from the work area, some improved operator technic, and especially the purchase of a portable vacuum cleaner, the effective results of which were immediately manifested by the improved housekeeping and reduction of deposited dust throughout the work area.

Some time after the second study was completed, arrangements were made with the private physician employed by the plant to obtain blood smears of all operators with a view of making basophilic aggregation tests to determine the extent of lead absorption. Due to press of our own laboratory work it is indeed unfortunate that the lead smears were not obtained when the trouble started a few months previously. Again, smears were not obtained at regular intervals so that curves cannot be plotted to show the reduction of the basophilic from time to time. Original samples ranged from 1 to 2.5 per cent and then dropped to 1 per cent and 0.5 per cent. McCord and his associates state:

> In the adult healthy human, the percentage of basophilic aggregations is usually below 1.0 per cent, frequently as high as 1.5 per cent but rarely as high as 2.0 per cent. In the use of this testing procedure in connection with the diagnosis of lead poisoning or lead absorption, no consideration is usually attached to findings until the number of basophilic aggregations rises above 1.5 per cent or 2.0 per cent.

The results of the second study were transmitted to the management and interpreted to the extent that a serious lead hazard still existed in this work area. The down-draft ventilated grilled-top hoppers were then installed. Slide type blast gates were installed at each hopper to regulate the air-flow. A cyclone dust arrestor was also located outside the building wall between two wings of the plant buildings. The only criticism that the management had of the ventilated hoppers was that they were trapping and exhausting to the dust arrestor about 16 per cent of the material daily prepared to be used in the electrical specialties. This seemed too great a loss, so modifications to the system were immediately made. Dust traps were made for the bottom of each hopper. These traps, 11" dia. x 19" high, caught practically all of the heavy material while only the fine dust, not necessary for the specialties, was exhausted to the arrestor outdoors.

No further sickness or complaints of any kind have been received by the management from the workers in this section since the new ventilation system has been in operation. Up to date,

bureau activities have prevented a final check study but this will be made in the near future.

The elimination of this exposure is based on chemical and engineering control. Closer medical control through early and continued basophilic aggregation tests would have been of material aid in the solution of this serious exposure.

SILICA

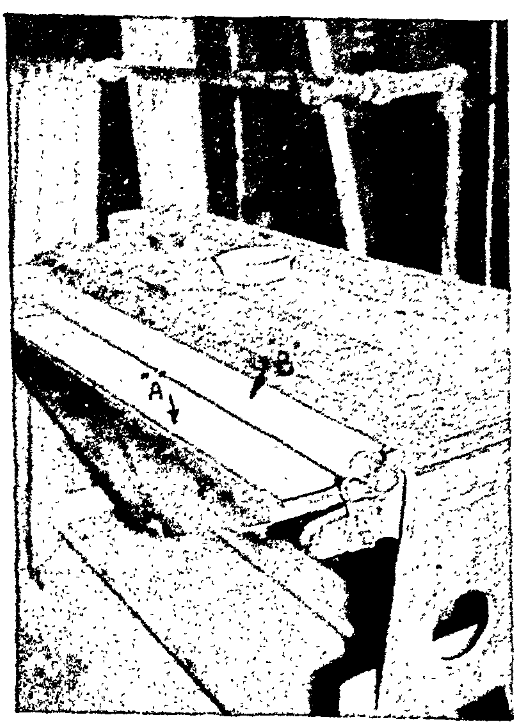
As a result of a general survey of an industry in the state, there was uncovered a very serious silica exposure, one which has been prevalent in the industry for the past 25 years.

In the manufacture of tubing, many of the sizes are produced from solid billets by means of extrusion machines. Some sizes, depending on wall thickness, require that short sections of the tube be cast and then extruded to finished dimensions. To cast these tubes, a sand core is required, and it is during one of the operations in the series pertaining to the core preparation that the silica exposure is serious.

Various grades of beach and building sand are intimately mixed in a standard foundry Simpson mixer until a "mud" of proper consistency has been developed.

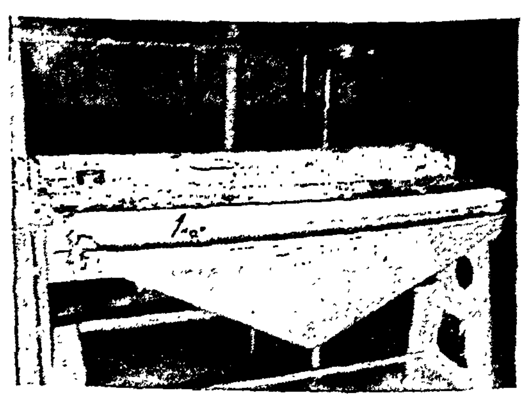
A hollow, perforated, steel core mandrel is next covered with asbestos paper. This is done on a bench containing two sets of small rolls for supporting the ends of the mandrel. Depending on the particular diameter core desired, an adjustable steel knife edge is set at the proper distance from the center of the steel mandrel. Pails of the prepared "mud" are dumped on the table in back of the mandrel. Some plants use

FIGURE 3



Three-quarter side view showing screen top of hopper "A" and sand ridge "B"

Hand sanding operation to remove ridge and to bring cores to proper diameter



Front view of hopper arrangement for core sanding operation for removal of ridge "B"—flexible exhaust tube "A" connecting to rear of hopper

a regulated electric drive, others use a hand-operated crank to turn the steel mandrel while a second operator keeps feeding the "mud" onto the revolving mandrel by hand. In time, the proper thickness of the first rough coat has been applied. These cores are then placed on end in steam coil dryers and kept there for 24 hours at a pre-determined temperature. Many cores require a double layer of "mud" to build it up to the proper diameter, while others just require the first application. In either event, the hand sanding operation produces excessive concentrations of silica dust with resulting exposure to all of the operators concerned. As may be seen in Figure 3, a longitudinal ridge is left on the core face. This ridge cannot be smoothed off while the "mud" is moist. The usual procedure is to stand the dried core on end, use sandpaper, a leather glove or a piece of fine mesh screen and rub off the ridge. This ridge must be removed from either the first or second layer of "mud" or it produces a ridge inside the tube when it is cast.

A chemical analysis of settled dust from one plant, taken from the top of an oven 7′ 0″ above the floor showed 35 per cent free silica, while a sample of dust from the floor where the core sanding operators were stationed showed 58 per cent free silica. At another plant settled dust over an oven door carrier showed 42 per cent free silica while a sample of dust from the floor and from a bench adjacent to the core sanding operator showed 71 per cent free silica.

Concentrations of dust to which core sanding operators were exposed in the first plant showed a value of 125 M.p. per cu. ft. of air while in the second plant a count of 265 M.p. per cu. ft. of air was obtained.

The nature of the exposure and the dust concentrations involved precluded any arguments as to the necessity or desirability for immediate and effective control. The basis of the control was already present in every one of the plants involved, namely the core benches themselves.

Sketches were prepared right on the job during the period when the engineering survey was being made. A screen-top hopper was suggested under the cores to be sanded. One company had an old, unused industrial vacuum cleaner, so they connected it to a 1½″ dia. stub at the rear of the hopper. The sanding operation, instead of being performed in an up-and-down manner, and quite vigorously, is now performed with the core and mandrel in a horizontal position on the core lathe while the operator slowly passes his glove or sandpaper or mesh screen over the ridge and then the body of the core, if found necessary to bring the ends to the proper diameter. Maximum concentrations resulting from this latter technic are about 1 M.p. per cu. ft. of air. Housekeeping was so improved that the management of one plant is equipping similar operations in five of its plants with exhaust, though fans are to be used for suction instead of a vacuum cleaner.

Air determinations over the unit connected to the industrial vacuum cleaner were made with the heated thermometer anemometer. Readings were taken on the longitudinal center line of the 9″ wide screen top of the hood. Both thermometers were held about 1″ apart and about 2½″ above the screen top. Four volts were used in taking the readings. Results indicated a face velocity of approximately 68 f.p.m., quite low for normal industrial practice. The effectiveness of the screen top and the decided change in operator technic does not require any larger face velocity—gravity also helping to drop the fines to the hopper. For a fan installation at another plant, it was suggested that 375 c.f.m. be exhausted through the screen-top resulting in a face velocity

of 104 f.p.m. A 5″ dia. exhaust connection is necessary resulting in a pipe velocity of 2,800 f.p.m. with this higher air volume. A twin hopper, each with a 3½″ dia. tap, connecting to a 5″ dia. exhaust is a more effective arrangement. The same air volume per bench is to be exhausted as for the single hopper.

One installation is complete and operating successfully with the industrial vacuum cleaner as the source of suction, another is in the process of installation, while a third plant, due to the use of a new extruding machine, has discontinued the manufacture of 90 per cent of the sand cores previously found necessary in the older method of casting tubes. The cores which are necessary to be made for the larger tubes are sanded with the mandrels on end due to the excessive weight of both steel mandrel and core, and the operators are supplied with and use approved type respirators for their protection against the inhalation of the high silica dust developed during the sanding operation requiring approximately one hour every day for its completion

The elimination of this exposure is based on chemical and engineering control.

BENZOL

Benzol, in spite of its toxicity, still maintains its position as the most valuable and effective industrial solvent.

Medical control, through the utilization of the urine sulphate test for the determination of benzol absorption previous to definite systemic poisoning, was the medium through which a serious benzol exposure was brought to light. Benzol has been used in various departments of one plant for a number of years. The use of the urine sulphate test for all of the operators involved throughout the plant soon demonstrated that though some of the percentages of inorganic to total sulphates were somewhat below what is considered normal, in the majority of cases they could be dismissed. When an analysis was made of the data pertaining to operators in the hand lacquer dipping division, certain pertinent facts were disclosed. Different types of lacquers, necessary for the varied work being processed, required varying amounts of benzol as a solvent. When the percentage of benzol reached certain proportions, and this only occurred in certain operating sections, thus localizing the problem, the urine sulphate test immediately demonstrated potential danger to the operators involved. The problem narrowed itself down to two operators who were most seriously exposed. Both of these men have been in this department for years without any apparent outward manifestation of physical disability. One is tall and heavy set while the other is short and slim. For a period of 3 months, operator " S," the heavy individual, seemed to be failing in health. During this period, 7 urine sulphate tests were made, and 2 of the early samples showed a 34 per cent ratio—definitely in the danger zone. The smaller of the two operators, to be designated as operator " P " showed normal ratios during this same period. A reason for this is to be advanced later in this discussion. Operator " S " was then transferred from the benzol exposure to other work in the department. During this period, 6 urine sulphate tests were made and they appeared quite normal. In the meantime, the ratios of operator " P " were swinging up and down, though no alarm was felt for him because he did not become ill.

It was during the transfer period of operator " S " that the bureau was called upon for help. A complete engineering survey was made of four hand lacquer dipping stations. Coincident with this survey atmospheric determinations were made to ascertain the exposure of the operators to benzol during cycles of their operations. This was

obtained by the use of nitrating tubes containing concentrated sulphuric and fuming nitric acids—the results being determined colorimetrically. The values obtained ranged from 22 to 63 p.p.m. Our bureau regulations require that benzol should not be present in concentrations over 100 p.p.m. This is based on pathological data and experience, and in the majority of instances may be entirely justified. However, this one plant experience of illness and concentrations below 100 p.p.m. seems to add to the picture of experience recently presented by Dr. Elkins, of Massachusetts. It is not intended, at a gathering such as this, to argue one way or another about a problem of such importance. This we will graciously leave to the chemists and pathologists. Since effective control must always be predicated on the work of these two groups, this control must of necessity be flexible so as to be varied as knowledge concerning the pathological effects of low concentrations of toxic materials over prolonged periods of exposure, is evaluated.

In spite of the low benzol concentrations found, and aside from the state regulation in the official report presented to the executives of the organization, it was suggested that ventilation be installed, as a matter of good industrial practice. It was also suggested that the urine sulphate tests be continued until after all control measures had been installed and for some time afterwards. Atmospheric determinations would then be made to determine the effectiveness of the control measures suggested and installed.

One of the four lacquer dipping sections may be designated as the east unit, while the other three, where operators " S " and " P " are located may be designated as the west unit. The east unit will first be discussed.

No control of any kind was provided over the dip crocks. The steam heated drying oven was provided with a 13″ wide hood extending over the entire 6′ 0″ width of the oven and located above the doors. A 7″ dia. exhaust duct was connected to the center of this hood. Eight 2½″ dial holes had been cut in the two front doors of the oven presumably for venting purposes.

Based on the engineering recommendations contained in the report of the study, and in consultation with our bureau, engineering data were developed and drawings made for changes in this east unit. The lacquer was contained in crocks. These crocks were set in metal containers to catch any drippings and this latter container was set in a ventilated metal shell. This ventilated shell is set 3″ above the inner metal container so that any heavy vapors dropping from the racked work as it is withdrawn from the crock will not spill over to the work area. Each ventilated shell is connected to a 5″ dia. duct, exhausting 300 c.f.m. at 2,200 f.p.m. in this connection. The air velocity between the metal shells is 170 f.p.m.

All crocks are supplied with hinged metal covers and are kept in place except when the specific crock is being used. If only one lacquer crock is being used, there being two lacquer crocks, one drain crock and one special wash crock, the ventilation is continuously operating, the covers on the unused crocks are kept closed and air is exhausted from between the shells of all four crocks. To prevent air currents from overhead monitors or drafts from adjacent openings in the partition walls affecting the exhaust system, a hinged top enclosure was installed over all of the crocks. The location of the forward edge of the hinged top was determined by studying and correcting operator technic, when the racked work was being withdrawn from the dipping operations. The control about these crocks has completely eliminated any odor of benzol in this work area and has defi-

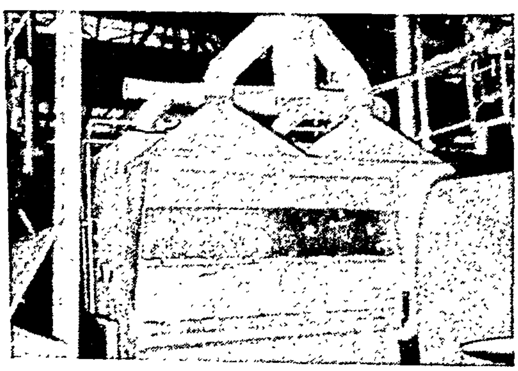
nitely prevented the dispersion of any benzol vapors to adjacent operators.

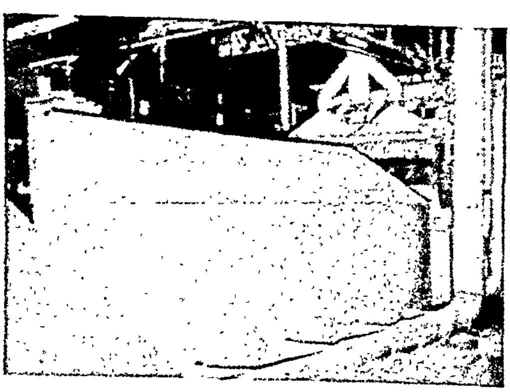
Three modifications at the oven finally cleared the work area of all benzol odors. The eight holes in the oven doors were sealed with metal discs. A 4″ dia. exhaust tap was connected from the bottom of the oven to the main exhaust line and supplied with a slide type blast gate. This 4″ duct is used for purging the oven of the heated benzol vapors and lacquer odors. This blast gate is only slightly " cracked open " and the exhaust is so nicely balanced that the oven temperature necessary for proper drying has been maintained. When the oven doors are open for removal of the racked material, no odors or vapors are discharged to the operator's breathing zone and then dispersed to the general work area, due to the oven being under a slight suction.

The original 13″ wide, single hood over the front of the oven was removed and a double 20″ wide hood substituted. A 6″ dia. connection to the top of each hood section exhausts 500 c.f.m. at 2,550 f.p.m. velocity in each connection. This 1,000 c.f.m. exhaust provides 100 f.p.m. velocity on the under side of the hood, too low for normal hood exhaust. In view of the expected and resulting excellent purging of the oven, this low face velocity was found to be sufficient. Draft guards, one on each outer side of the hoods, 28″ long and tapered from 20″ to 10″ prevent side air drafts from whipping any

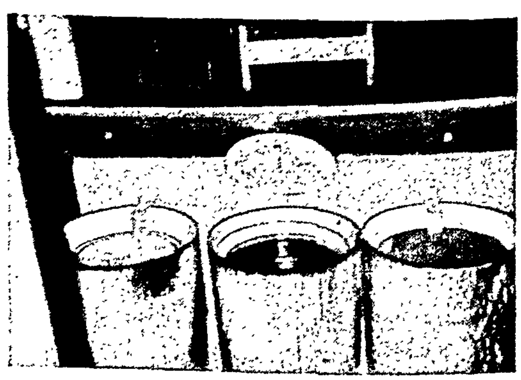
FIGURE 4

Close-up of double hood arrangement with draft guards in place





Rear of enclosure over crocks showing exhaust piping arrangement from shells



Crocks set in ventilated shells inside of enclosure—center lacquer crock being used

benzol vapors or lacquer odors out of the oven when the doors are opened.

The installations just described for the east unit are shown in Figure 4. Crocks, inner and outer shells, hinged covers, enclosure over the shells and crocks, exhaust system from ventiltaed shells, oven hoods and exhaust connections and draft guards are clearly shown. The ventilation about the crocks and the purging of the oven were the main control items in the east unit.

The west unit presented exhaust problems not present in the east unit just described. There are three operating stations, though the two outer units are normally used. Each unit consists of three lacquer crocks, two sets of mechanisms for rotating the mesh baskets, containing dipped work, to remove excess lacquer and two steam heated drying ovens. Benzol is disseminated from dipping, rotating, and drying operations—the worst dissemination point being the ovens.

The three units are set in line, operator " P " being located at the farther unit near a large opening in the partition wall, while operator " S " is located at the third unit in the line. There was no control of any kind originally provided for any of these units. The only air movement provided was by the fans in the oven set-up which recirculated the benzol-laden air through heater and work.

The prolific source of dispersion was from the leaky ovens. Sheet metal screws and cement were freely used and all open joints and loose sheet metal parts were made absolutely tight. The focal point of attack for control was at the rear unit where operator "S" is located. The discharge from the circulating fan, set on the floor, is to a baffled opening in a heater casing set over the fan. The fan connection was not tight, so that a major portion of the benzol laden air being drawn from the bottom of the dryer housing was discharged against the baffle and was then deflected to the floor. The velocity of discharge and the fact that these vapors were hot aided in their dissemination to the breathing zone of the operator and then to the general work area of the department. The large opening in the partition wall near where operator " P " is located caused an appreciable draft from operator " P " to operator " S " with the result that the odors of benzol and lacquer were decidedly annoying and irritating at the latter work station—this in spite of the fact that approximately the same benzol concentrations were found at each work station, namely 63 p.p.m. The absence of odors eliminated operator " P " from consideration for the time being, and his potentially dangerous condition was only demonstrated when the bureau plotted the results of the urine sulphate tests. This will be discussed later.

A sheet metal casing was dropped from the bottom of the heater casing to the floor, entirely enclosing the cast iron fan casing. A 4″ dia. exhaust duct, provided with a slide type blast gate, similar to that installed for the oven at the east unit, was connected from the oven to an exhaust line. The sealing of all open joints in this oven, together with its proper venting and baffling of the lower section of the heater casing about the fan immediately produced a remarkable change in the working area. This was decidedly noticeable as operator " S " worked between two ovens, as did operator " P " but the former was also in the zone of the draft from operator " P " carrying benzol vapors from the farther operating station.

Since the work to be hand-lacquered was contained in heavy mesh baskets and not racked as at the east unit, a large shallow enclosure, almost like a spray paint hood was developed. The weight of the basket and its material necessitated a 1¼″ dia. pipe rail support for

the operator so that he could grasp this support when he lifted the basket from the dip crocks. These crocks are supplied with annular ventilated shells similar to that at the east unit. It is contemplated that the height of the hood will be reduced so that the operator's head will not be in the hood above the crocks when dipping is being performed. The weight of the basket and work may preclude this.

Up to the present time, effective control has been provided only for operator "S." Due to the results from this one work station, an engineering layout was prepared and approved by the management for all three operating sections of the west unit. Location of dipping crocks, rotating mechanisms and ovens have been rearranged to facilitate easier handling of the work and to aid in the ventilation of these dispersion points. Work is at present being done in connection with this major operating change.

The new layout includes a ventilated enclosure for the rotating mechanisms while the basket and work are rotated to remove excess lacquer, and an exhaust tap is to be provided for the drip container under each mechanism to remove any possible benzol vapor collecting in these containers.

Brass wheels in the fans and completely grounded systems were recommended for all of the systems involved.

Some significant points relative to the plot of the urine sulphate ratios may be mentioned:

1. To date, 35 samples of each operator have been plotted.

2. The sample taken on March 23 of operator "S" a short time after his return to the benzol exposure, and apparently after his system was cleared of benzol, showed a ratio of 31 per cent—the lowest it had ever dropped to.

3. The gyrations of the ratios of operator "P" may be explained by the fact that when the center of the three dipping units is in operation, for some unknown reason the area between this unit and operator "P" is heavy with benzol and lacquer odors, this in spite of the draft from operator "P" toward the center unit. Personal susceptibility may also be an important factor here. This may possibly be eliminated because the ratio of 59 per cent on August 10 resulted from the operation of the center unit, which also accounts for the jumps in February and March. The center unit is used periodically and only on special work.

This benzol exposure has been discussed at great length, first due to the toxicity of the material and second due to the possible change of our knowledge of the effects of continued low concentrations over long operating periods. If the data of Dr. Elkins or Dr. Hunter are to be viewed in their proper light, trouble is to be expected from further exposing operators "S" and "P" to this toxic solvent.

The careful development of proper and adequate engineering controls for the protection of industrial health against occupational exposures means that each problem encountered requires a "tailor-made" analysis. This factor should never be lost sight of because in the final analysis a life may depend on the effectiveness of the control utilized.

DISCUSSION

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THIS paper outlines four specific ventilation problems and describes the solution of each. We are not inclined to disagree with any of the statements in the paper, and take the opportunity to direct attention to several outstanding items.

In each instance the ventilating equip-

ment has been designed in a systematic and logical manner. The designer has decided the direction in which the air should move and has arranged the duct terminals accordingly. This seems to be a rather simple matter but, nevertheless, is frequently neglected. We recall an instance where three sources of ventilation were applied to the same job. One source tended to move the air inwardly, one outwardly, and a propellor fan produced a strong transverse flow.

The illustrations show the importance of placing the terminals as close as possible to the sources of contamination. In this way adequate ventilation may be obtained without moving an undue volume of air and without involving an undue expenditure for equipment, power, and heat.

The conditions near the rolling mills were unpleasant but apparently did not cause illness. These situations are not uncommon, and it is frequently difficult to decide what should be done with them. In this particular instance the source of contamination was relatively small and, although somewhat inaccessible, could be ventilated without undue expenditure for equipment or power. The degree of ventilation shown makes it unnecessary to be concerned with the concentration and toxicity of aldehydes or other acrid substances.

The section dealing with the lead exposure involves three rather typical situations:

The first is the use of proprietary preparations, without much knowledge of their composition. The second is the use, in the interests of economy, of equipment at hand. The results frequently are not very satisfactory. The third is the tendency for consultants, who are not financially related to the job, to handle the phase of the problem in which they specialize in an effective manner but to overlook some of the important economic details.

The illustration displayed in describing the silica problem shows the duct terminals close to the source of the dust. In this way adequate dust removal is obtained without using an excessive volume of ventilation.

The description of the benzol exposure suggests questions regarding the toxic limit, individual susceptibility, and the interpretation of occasional measurements. These rather difficult questions probably do not arise in connection with the ventilation system shown. In many instances, however, the sources of contamination are so large that the complete removal of the objectionable substances would be prohibitively difficult and prohibitively expensive.

Accuracy of Plate Counts Made from Milk Products as Affected by the Temperature of Incubation*

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A NUMBER of years ago studies were begun on the efficiency of various bacteriological incubators used in milk control work. It was felt at that time that some of the discrepancies in bacterial counts obtained between different laboratories examining the same sample of milk or between duplicate platings of a sample in one laboratory were due in part to faulty incubation. It was generally assumed that incubators were quite accurate and that incubation of plates at a temperature of 37°C. for 2 days was entirely satisfactory.

That the first assumption was faulty was shown by various workers as noted in the review given by Pederson, Yale, and Eglinton.[1] It was also noted by Pederson and Yale,[2] and Yale and Pederson [3] that 32°C. for 2 days was a better temperature for incubation of milk plates than 37°C. for 2 days, since there was less error in plate counts caused by variations in temperature in the incubator, and the counts obtained were a more constant percentage of the total maximum count obtainable.

These results were in line with observations from various laboratories in which it had previously been observed that 30°C. was a better incubation temperature for dairy products than 37°C. The findings reported by Pederson and Yale [2] have been corroborated in other laboratories, and results of studies have been summarized by Kelly,[4] Yale,[5] and Abele.[6]

Studies on the temperature of incubation and the various types of incubators have been continued by the author. Up to the present time 22 different laboratory types of commercial and experimental bacteriological incubators have been examined.

It is not the purpose of this paper to criticise individual incubators in regard to the various factors that determine their usefulness but rather to discuss how the incubation influences the plate counts. The incubation conditions attained in many incubators now in use, as noted in previous reports, are so poor that these inadequate incubators cannot qualify for milk work under the specifications given in *Standard Methods*.[7] These methods specify an incubation temperature of

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37°C. with a tolerance from 35° to 37°C., and a construction that will give suitable incubation. To comply with these conditions and to be satisfactory for use in the examination of dairy products, the temperatures in the incubator chambers must be both constant and uniform, that is, constant throughout the incubation period and uniform throughout the chamber; the temperature of the agar plates should be raised from room temperature to the temperature of incubation under constant conditions; and the incubator should be so ventilated that plates neither dry so as to make counting difficult, nor become so moist that the incidence of spreader plates is abnormal. The incubator should also be simple in operation and adjustment. Many of the anhydric incubators introduced within the last few years are better than those formerly sold, but it is doubtful whether an incubator which completely satisfies these conditions can ever be made. The correction of one fault is frequently made at the expense of another—for example, simplicity of operation at the expense of uniformity in temperature.

Two new types of forced circulation anhydric incubators have overcome difficulties caused by the slow heat transmission of water jacketed incubators, and yield incubation temperatures that are constant and uniform. However, at 37°C. a variation of 1.3°C. was shown in the better of these two which caused more than a 50 per cent variation in replicate plate counts. Therefore, incubation conditions are no better than those obtained in the water jacketed types. Other new types of incubators show temperatures that vary greatly in various parts of the incubation chamber and other faults such as too much or too little ventilation resulting in excessive drying of plates, or excessively moist conditions. In fact, the two extreme conditions of excessive moisture and drying are noted in different parts of the chamber of a single model.

Several attempts have been made to obtain greater uniformity in the temperatures in the incubation chamber by forced circulation. Some earlier attempts were unsuccessful in that air pockets were formed, thus increasing temperature differences as well as causing excessive drying of some plates. The two new models just mentioned are far better than earlier models, but it should also be remembered that the additional problem of caring for a motor has been introduced. Other recent incubators will yield incubation temperatures which vary only a fraction of a degree. Although accurate and satisfactory for certain types of research, these incubators are far too complicated and expensive for the routine milk control laboratory.

Many of the present types of incubators would be entirely satisfactory for milk control work if a temperature more suitable for incubation were used, that is, 32°C. Several of the present types of incubators will give temperatures within ±1°C. of any temperature in the 30° to 37°C. range. A variation of ±1°C. in incubating temperature at 32°C. causes on an average only a 4 per cent variation in count, while a variation of ±1°C. at 37°C. causes an average error of more than 25 per cent. The counts on various samples of milk when plates are incubated at exactly 32°C. will seldom fall below 95 per cent of the total maximum 2 day count that can be obtained, but even if incubated at exactly 37°C. the counts obtained may vary from 10 to 90 per cent of the maximum 2 day count. It is evident from these facts that many of the present unsatisfactory types of incubators which must be discarded if present standards are enforced, would be satisfactory for milk control laboratories if the present 37°C. temperature were changed to 32°C. In other words, there are a number of types of incuba-

tors which are satisfactory for use in milk work at 32°C. while at 37°C. even the best incubators cause very real and serious errors in counts.

If the errors which are due to failure to hold the temperature of incubation constant can be overlooked as is the case at present, it would seem reasonable to overlook lesser errors caused by faulty pipettes, dilution blanks, etc., some of which are now emphasized.

In conclusion it may be said that it appears to be impossible to make a perfect incubator for milk control work. Even if one were made and operated at 37°C., counts obtained in examination of milk samples would be subject to a considerable uncontrolled error. It therefore seems logical to change the temperature required for incubation to that temperature, that is, 32°C., at which slight variations have no material effect on the plate count and at which the counts obtained from various samples of milk would be a more constant percentage of the total maximum count obtainable.

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Newer Medical Methods of Appraisal of Nutritional Status*

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THE files of our hospitals must contain millions of records of physical examinations beginning with the classic line, " The patient is well nourished . . ." On countless school health examination cards one finds confident ratings of nutrition as " Good," or " Fair," or even the puzzling designation of " Very good " indicating some sort of supernormal state. In equally wide use are designations based upon height and weight indices leading to such classifications as " Undernourished—more than 13 per cent under average." Less frequently, more complicated indices are used based upon formulae involving a number of physical measurements.

The two methods referred to—the appraisal of nutrition based upon the clinical examination, and the appraisal based upon physical measurements—have found the widest use in school health work. Other methods of survey, of course, have been and are in use, such as dietary studies of families and individuals, and the observation of improvement, according to various criteria, of groups provided with supplementary feedings as compared with control groups. In the main, however, routine school procedure in the appraisal of nutrition bases itself upon the clinical examination or the use of physical measurements, or a combination of both.

The limitations of both procedures have often been pointed out in the literature. Nevertheless such appraisal permits the selection, with varying degrees of reliability, of definitely undernourished children; that is to say, of children suffering from more or less gross malnutrition. The fact that, at the same time, such methods result in the selection of some children who are not demonstrably undernourished, need not especially concern us. This error is not at all the chief limitation of such procedures of nutritional appraisal. The chief limitation is rather the failure of these methods to select those children who, while not suffering from obvious malnutrition, do have a nutritional impairment which deprives them of abundant health and full vitality. It is this borderline between a level of nutritional status at which obvious illness occurs, and a level of nutrition which permits the fullest realization of individual potentialities which is our immediate concern. This borderline, which has been termed the latent state, repre-

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sents a condition of nutritional deficiency, the signs of which are not detectable by the ordinary methods in common use.

The importance of the latent state must be emphasized because the use of methods of diagnosis in school work and other public health surveys which will permit its specific diagnosis will open new possibilities of combating nutritional impairments. In the first place we know that we can most easily and economically prevent the development of manifest disease states if we are able to deal with the earliest deviation from normal. In the second, even though the latent state is not characterized in itself by obvious health impairment, we cannot rest content with the existence of a minimum or average level of nutrition and health, but must direct our efforts toward the promotion of the fullest degree of well-being. Finally, as progress is made in dealing with ever earlier stages of nutritional impairment, we approach our ultimate objective of prevention itself.

The late Lord Moynihan expressed this point of view very precisely. "The ultimate object of all attacks upon disease," he said, "is the discovery of methods, not so much of curing established disorders, as of checking them in earlier and still earlier stages of their career, and finally of preventing their incidence and development."

From this point of view the latent state of malnutrition is regarded as a medical problem, no less important in its specific characteristics, let us say, than latent tuberculosis or latent syphilis. Therefore, as an essentially medical problem, the latent state of malnutrition requires specific medical methods of diagnosis.

Such specific medical methods are not lacking today. In recent years progress in the field has been rapid indeed. Studies of manifest deficiency disease on the one hand, and of deficiency states induced in laboratory animals on the other, have led to the development of a number of specific chemical and physiological tests for specific nutritional deficiencies. Many of these tests find current application in hospitals and clinics.

It is on the order of the day, therefore, to bring these newer medical methods of nutritional appraisal into the field of public health work; to test them, not only in themselves, as methods, but in their applicability to large groups in survey work; to select, refine, and simplify so that with the greatest economy of effort the widest possible application of specific nutritional tests may be made to secure as reliable information as we may on nutritional status.

In pursuit of this goal, a comprehensive study of nutritional appraisal has been under way in New York City during the past year. It is planned and organized on a coöperative basis by the Cornell University Medical College, the U. S. Public Health Service, the New York City Department of Health, and the Milbank Memorial Fund, and is assisted by the Work Projects Administration.*

Its purpose is twofold: (1) to study the newer medical methods for diagnosis of latent nutritional deficiencies and to determine the most appropriate means of organizing the several procedures into a feasible system which may be applied to schools and other large groups of the population; (2) to determine the prevalence of specific nutritional deficiencies in a large sample of the population.

The study is conducted in the Seward Park High School, a public senior high school of New York with an enrollment of approximately 6,000 pupils. Participation of the pupils is voluntary, and approximately 4,000 requests for

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* Official Project Number 665-97-3-68.

examination have been received. Approximately 1,000 pupils were examined between March and June of 1939.

The procedures of the study include clinical and dietary investigations, hematological examination, chemical tests on fasting blood specimens, and physiological tests. A detailed report of the methods and procedures is in preparation.*

A brief discussion of two examples of the laboratory procedures may serve to illustrate the relationship and implications for nutritional appraisal of the entire program, and some of the problems in method and interpretation as well.

Let us consider first some of the hematological procedures.

Not only diets inadequate in iron, but other factors as well may operate to produce a deficiency state, nutritional anemia. When well marked, pallor alone will permit a diagnosis based upon simple inspection. But this is not the case with anemias that are of less than marked intensity. It is difficult for clinicians to judge the presence of moderate anemia with certainty from the appearance of pallor, and of course impossible to assess its severity. If we wish to determine, therefore, whether nutritional anemia is an important and frequent manifestation of deficiency disease in a given community—as for example, a school—the use of objective hematologic methods is imperative. In the present study, the hemoglobin content of whole blood, the hematocrit, or volume of packed red blood cells, and the red blood cell count are determined. It seems to me that two aspects of these procedures deserve emphasis: the question of method, and the question of " normal " values.

It is unfortunate that hemoglobin determinations are often of small value because the method employed is of low reliability. It is easier to do an accurate hemoglobin determination colorimetrically than a less accurate determination by means of the more tedious older methods.

The " normal level " or, better, the " optimum range " must be determined for evaluation of the results of a given survey. It would appear that studies of children reared under especially favorable conditions in families of high economic level in the same geographic area would provide the most suitable basis for the establishment of such an optimal range. This is true, of course, not only of the hematological studies, but of all the measures of nutrition with which we are working. The study is preparing to undertake the examination of school children of high economic level, using the same procedures now employed in the examination of poor children.

Scurvy, the manifest disease of vitamin C deficiency, occurs but rarely in urban children of school age. Nevertheless, there is considerable evidence that many individuals present significantly lower blood plasma levels of vitamin C, as determined by direct chemical measurement, than those living in favorable circumstances in families of high economic level. The question arises as to whether this also represents a " latent state " of malnutrition, and, if so, whether it occurs with remarkable prevalence.

The study includes, therefore, as one procedure in its system of examination a blood plasma ascorbic acid determination. Again, the question of reliability of method must be stressed, and a critical study of methods will be the subject of one of our subsequent reports.

In an effort to obtain more direct evidence of the presence of a latent state of vitamin C deficiency, a physiological test is used in addition to the chemical determination. A physiological test used in detecting the latent state

* This report is scheduled for publication in *Milbank Memorial Fund Quarterly*, Apr., 1940.

has been defined as the application of an exaggerated stimulus or stress in order to elicit signs which occur naturally in the manifest deficiency disease. With reference to vitamin C, a test of capillary resistance is the subject and method of study.

The exaggerated stimulus consists of the physical stress of a partial vacuum applied to the skin for a specified interval of time. The sign elicited is, of course, the occurrence of hemorrhage as petechiae or gross suffusion.

The test has seen fairly wide use in recent years in conjunction with studies of vitamin C nutrition. Some investigators are of the opinion that the test is of value in revealing subnormal vitamin C nutrition, but more often than not such investigations have led to confusing results.

We believe that inappropriate methods of testing and unreliable test procedures and criteria for rating of test results may account, in part, for this confusion. Moreover, the assumption that a physiological test and the corresponding chemical determination necessarily are closely correlated does not seem to be warranted. One may mention latent tetany in which the blood calcium and the neuromuscular electrical reactions do not always go hand in hand.

In the appraisal of vitamin C undernutrition, the latent state will escape us completely if we must rely only upon our clinical judgment or indices of nutrition. But both chemical and physiological tests offer the possibility of simple and direct specific appraisal.

It is from the same point of view and with the same critical testing of methods that the study includes tests of dark adaptation with reference to vitamin A, galvanic tests of neuromuscular response, roentgenograms of bones, and chemical determinations of blood serum calcium, phosphorus, and phosphatase. Detailed clinical examinations and dietary records provide data with some bearing on etiology.

If we are to accept present criteria, which we are by no means convinced are optimum, the range of values which we obtained in certain of these tests appears to indicate—although our collection of data is not yet complete—a significant prevalence of nutritional disturbance. Since these escape the simple medical inspection it would seem that specific biochemical and physiological tests merit consideration as a part of routine health examinations.

As the study progresses, it may be anticipated that a series of tests will emerge, feasible in public health survey work, and yielding information on the occurrence of specific nutritional deficiencies, which eludes our ordinary methods in common use.

With more widespread use of specific medical methods of nutritional appraisal, the nutrition problem will be more clearly defined, and a more substantial basis will exist for all phases of public health nutrition programs.

The Importance of Economical Milk in Human Nutrition*

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THE most recent figures available from the National Resources Committee [1] on Consumer incomes, indicate that nearly half the families in the United States in 1936 had incomes of $1,000 a year, or even less, and about half of these families have been on relief at one time or another. Similar figures lead to the estimate that the middle American family in that year had an income of $1,160 or just about $20 per week.

Imagine, if you can, what a job it would be to pay house rent, clothe the family, try to give the children some education, and, above all, feed the family for good nutrition on that income.

Dietary studies undertaken during the past year through various state experiment stations [2] indicate that many groups are inadequately fed. While families of employed wage earners and clerical workers in cities [3] spent from 25 to 40 per cent of their income for food, a very large percentage of the so-called "good diets" fell short in their allowances of the essential protective foods. These same surveys indicate that these diets were most deficient in milk and the green colored and leafy vegetables. In every region families spending a small amount of money for food used only a small quantity of milk. In fact, it was obvious that the average diets include only from one-half to two-thirds as much milk as they should, and when food expenditures went down for city clerical workers, the consumption of milk and dairy products went down at the same time.

The fact that milk consumption generally is far below the standards set for good nutrition leads us to estimate that a part of the inadequate feeding and lowered general well-being encountered is the result of a too low milk intake. All the more reason, then, why families who have little to spend for food must have economical milk and milk that can be used easily by a possibly debilitated intestinal tract. This need for a safe, easily digested and economical whole milk supply has focused attention on the place of evaporated milk in human nutrition. Research has gone far in giving a better understanding of the nutritive value of evaporated milk, its effect on growth and general nutrition. Much of the work has been summarized previously [4]; thus, for the most part, this paper covers summaries of the later reports.

Recently, Roberts and coworkers [5] reported studies showing the effect of evaporated milk fed to a group of institution children in Chicago. Growth in height and weight and the ossification

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of bones of the wrist as an index of anatomic age were considered. The addition of one pint of diluted (1:1) evaporated milk to a rather mediocre institutional diet proved a factor of safety. It supplemented and made more nearly adequate an inadequate diet. By all methods of comparison, the growth of the children given evaporated milk exceeded that of those not receiving the supplement. Somewhat greater progress was also noted in the osseous development of those children receiving evaporated milk.

As early as 1913, Brennemann [6] explained the favorable results obtained with boiled milk in infant feeding on a curd character basis. He held that the successful modification of cow's milk for infant feeding depended primarily upon the ability to alter the particle size of the curd formed in the stomach. Within recent years curd size and curd tension have become more or less accepted indices of the digestibility of milk and to a large extent of its suitability for infant feeding. There is no doubt that one factor contributing to the increasing popularity of evaporated milk in infant feeding has been the softness of its curd. Doan and coworkers [7] recently stated, "Since the effect on curd tension depends entirely upon the temperature used and the time of exposure, autoclaved milk and evaporated milk frequently exhibit no curd tension or a curd tension of zero."

These same workers presented data that would leave little doubt that evaporated milk was evacuated from the human stomach more rapidly than untreated milk, also that evaporated milk, like buttermilk and soft curd milk, traveled farther and disappeared more rapidly in the intestine of rats than hard curd milk. Their *in vivo* and *in vitro* studies [8] on the relative digestibility of various types of soft curd and hard curd milks led to the conclusion that evaporated milk and acidified milk show superior digestion characteristics. These milks, and to a lesser degree boiled milk, digested the most readily of all types studied.

Reynolds, Macy, and Souders [9] report similar results with children. They partly interpret this as being due to the fact that evaporated milk and acidified milk produce very small sized curd particles which accelerate gastric clearance, thus bringing the curds into the intestines for digestive action more quickly and in smaller aggregates, thereby allowing greater surface area for enzymatic activity. Seven children were studied to determine whether milk of different curd tension alters intestinal motility rates. Pasteurized, evaporated, and another soft curd milk were the milks used. Roentgenograms made at regular times indicate that the evaporated milk began emptying from the stomach in much less time than the pasteurized milk. All along the tract the evaporated milk was more evenly dispersed and in fluffier masses, thus presenting greater surface areas to the digestive juices than the pasteurized milk. Even in the colon these masses did not appear as compact and solid.

Such *in vivo* studies confirm the earlier work of Wallen-Lawrence and Koch [10] who observed that boiled and evaporated milk are attacked more rapidly by trypsin than unheated milk. They interpret this on the basis of the destruction by heat of a labile trypsin inhibitor found in the whey of raw milk. Flora [11] using animals, noted a similar increased tryptic activity with boiled and evaporated milk. Poole and Cooley [12] report evaporated milk is comparable to breast milk in the digestive tract of premature infants. Jeans and Stearns [13] by means of metabolic balance studies have indicated the suitability of evaporated milk in feeding both infants and children.

Hummel, Hunscher, and Macy [14] have shown that evaporated milk fed

to children consistently gave a larger storage of nitrogen, sodium, and potassium, and so an added impetus to soft tissue formation in these children. A larger potassium-sodium retention during evaporated milk feeding periods was a further indication that soft tissue formation was progressing at a faster rate. The nitrogen retention on evaporated milk was more than doubled in some cases and the acid-base mineral balance was equally great during this period. All of the children showed a positive retention of the basic elements, calcium, magnesium, sodium, and potassium as well as the acid elements, phosphorus, sulphur, and chlorine, and the calcium-phosphorus ratios were higher. When the subjects were taking evaporated milk, their calcium retentions were equally as good as with the plain fluid milk or even better. The children as a group, retained more calcium per kilogram of body weight when taking evaporated milk than when taking plain fluid milk.

Earlier work by Kramer, Latzke, and Shaw[15] with young adults, by Jeans and Stearns[13] with infants, and by Willard and Blunt[16] with young children, warrants the conclusion that from the standpoint of permitting good growth and high retentions of nitrogen, calcium, and phosphorus, evaporated milk compares favorably with raw whole milk. In fact, Willard and Blunt conclude that evaporated milk is a satisfactory source of calcium, phosphorus, and nitrogen, slightly superior to pasteurized milk. It is now recognized that milk nutrients are as efficiently metabolized from evaporated milk as from any other whole milk.

For years milk was looked upon as the perfect food. Then, finally, came the realization that milk is not perfect because it is low or deficient in certain constituents, but, in spite of these deficiencies, is one of the very best foods for old and young alike because milk furnishes more completely than any other single food and more economically the essential factors for good nutrition.

Milk and milk products are among the best sources of vitamin A. While relatively poor when compared on a weight basis, they are important because of the large amounts consumed. The earlier work of Farmer and Lemkau[17] comparing evaporated milk, raw and pasteurized milks collected at various seasons, as well as the milks before and after evaporation, after homogenization, after sterilization, and after storage for 6 months showed definitely there was no loss of this vitamin in the processing. More recently, Cannon[18] assayed both irradiated and non-irradiated evaporated milk, finding that the evaporated milks contained 4.28 International Units of vitamin A per gram or approximately 2,140 units per reconstituted quart. Steenbock[19] also contributed a vitamin A study of butter fat from raw milk and from evaporated milk, showing that the carotene and vitamin A content of the two were the same.

Even though milk is not an important source of vitamin B_1, considerable work has been done on the stability of the various fractions of the vitamin B complex in the processing of evaporated milk. The early work of Samuels and Koch[20] showed a loss of 20 per cent of the heat labile fraction of vitamin B. Bisbey[21] found approximately 25 per cent loss. More recent work by Knott[22] shows losses ranging from 20 to 30 per cent of the vitamin B_1 in the processing of evaporated milk, with as much as 40 per cent loss in the case of storage of over a year. In earlier studies on the nutritive value of pasteurized milk, Krauss[23] showed a loss of approximately 25 per cent of vitamin B_1 in that processing.

The work of Samuels and Koch[20] and also the work of Todhunter[24] on the heat-stable fraction of the vitamin

B complex, later called the flavin factor, shows there is no loss of this fraction in preparing evaporated milk. Inasmuch as Sebrell[25] has demonstrated that riboflavin is essential for human nutrition, evaporated milk being an economical source of this factor again becomes important to those families where the milk intake is apt to be low.

As early as 1930, the Bureau of Home Economics concluded, after working with families in South Carolina, that evaporated milk is the most practical food for the prevention of pellagra. Early analyses by Sebrell and associates[25] established evaporated milk as a good source of the so-called pellagra preventive factor. This was prior to the identification by Elvehjem[26] of nicotinic acid as the pellagra preventive factor. Recently, Elvehjem[27] has raised dogs on a diet made up solely of evaporated milk fortified with iron, copper, and manganese. The dogs developed no signs of blacktongue, the analogue of human pellagra. From all of this, then, it is safe to conclude that evaporated milk is a reliable source of nicotinic acid.

Improved methods of study[28] of vitamin C have indicated milk is an important source of this factor. Henry and Kon of England[29] present reports which indicate that at least half of the vitamin C content of evaporated milk is preserved. Meulemans and deHaas of Java[30] report only a very slight reduction in the vitamin C content of evaporated milk as compared with the original milk produced in that country. A comprehensive study has also been made in the laboratory of one of the large evaporated milk manufacturers. The results obtained were upon samples from 12 different evaporating plants. These data show evaporated milk 1½ years old retained almost 50 per cent of its vitamin C content. At 3 months, which is the average time elapsing between production and final consumption, this evaporated milk retained about two-thirds of its vitamin C. Macy and coworkers[31] report results of a study of 7 infants who received no vitamin C except that in evaporated milk. Their findings led them to conclude that evaporated milk furnished about one-fourth of the needed vitamin C for that special group of babies.

The Council on Foods of the American Medical Association accepts two methods of reinforcing evaporated milk with vitamin D—irradiation and the addition of a concentrate, as for instance the non-saponifiable fraction of cod liver oil. About 50 per cent of the country's evaporated milk supply is irradiated and about 10 per cent is reinforced with a vitamin concentrate.

Evaporated milk, as is all milk, is an ideal vehicle to carry extra vitamin D because milk is the most dependable source of the minerals, calcium and phosphorus, which are coördinated in activity with vitamin D. The ratio of calcium to phosphorus in evaporated milk as shown by Macy and coworkers[31] is correct for the body's best utilization. In a recent article, May[32] states that the linear growth and gain in weigth of 51 full term infants fed vitamin D evaporated milk was better than average in spite of the fact that the infants were handicapped to some extent at birth, being born of mothers from the class where prenatal care was limited. Macy[14] reports a stimulus to bone formation in older children as well as a more rapid rate of growth and height during the period when vitamin D evaporated milk was the milk supply. Thus, it has become an accepted fact that these reinforced evaporated milks, as shown also by clinical investigation of Jeans[33] and Stokes[34] will protect the normal, full term infant against rickets and contribute substantially to good growth of the infant and the older child.

To make a long story short, it is

evident that evaporated milk supplies qualitatively and quantitatively the vitamins milk is depended upon to supply.

Research undertaken has convinced those working with evaporated milk of its place in human nutrition and so has helped overcome unwarranted prejudices. During the past decade the use of evaporated milk in infant feeding has developed rapidly until today it is estimated from unpublished surveys that the majority of artificially fed babies are raised on evaporated milk and consume almost 10 per cent of the evaporated milk production. The conclusion of Jeans and Stearns [13] that the growth of infants on evaporated milk in length and weight was excellent and exceeded standard rates of growth has led to other studies of evaporated milk as the milk supply in the diet from birth through the 4th or 5th year. These studies, while as yet unpublished, will add to our knowledge of the sufficiency of evaporated milk in promoting growth, skeletal development, and in maintaining a state of good nutrition throughout childhood.

By way of closing, I should like to quote from a recent paper by Macy [31] in which she says:

> It seems reasonable to believe that evaporated milk has a definite value in the diet of the child. At times, objection to evaporated milk may be encountered on the grounds of unpleasant taste; however, these objections are, in the main, psychological and are more than offset by the ease with which this form of milk is obtained and kept sterile without refrigeration. Evaporated milk also permits ingestion in various concentrations.

Moreover, this form of milk lends itself to a degree of standardization and control unapproachable with the mammary gland.

Lillian Anderson, nutritionist with the Community Service Society of New York, tells us, in making recommendations for an adequate food supply for the family on a low income,[35]

> Many a toddler or school child has gone without an adequate amount of milk because a too expensive formula has been prescribed for the baby. Yet, the use of a less expensive but equally satisfactory formula could have made it possible to provide adequately for both children.

Thus the need is vital in human nutrition for an economical milk supply. Social studies show only too clearly that dietary adequacy decreases with income. Multiple dietary deficiencies inevitably accompany poverty. In the low-income group then, milk is more than ever important because it is unique among foods in its capacity to compensate for these deficiencies.

Workers in the medical, welfare, and public health fields are turning to evaporated milk recognizing that it supplies adequately the nourishment of milk at savings in cost as well as refrigeration, and with added safety and convenience. These factors strongly recommend evaporated milk in general family feeding particularly where economy is the link between nutritional need and fulfilment.

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Public Health Education

PUBLIC education about tuberculosis, diphtheria and syphilis is always timely and necessary and it is most likely to register and to endure in the minds of the people, and to influence their attitudes and conducts when such public education is addressed primarily toward the attainment of some particular objective of great public concern, such as the establishment or enlargement of a sanatorium, the creation or extension of clinics and other case-finding services, or the provision or increase of public health nursing service. People learn best when they are stimulated to do something about a particular need or a given situation.—George J. Nelbach

Chemical Agents in the Prevention and Treatment of Experimental Poliomyelitis*

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IT is generally recognized that sera and vaccines are of limited value in the control of poliomyelitis. There is therefore every reason for exploring other possible means of checking the disease. Its distinctly neurotropic character and singular pathogenesis make it imperative that measures for its ultimate control be sought along new lines. We recognize that the control of virus diseases in general is made difficult by virtue of the intracellular relationship of these infectious agents. Unless the pathogenesis of the disease is such that the virus causing it must at some time or other stem an immune plasma to reach new cells, there is little one can hope to accomplish by attention to the humoral side of immunity. Under such conditions the only hope would seem to lie in the creation of a resistant state in the susceptible cells themselves by means sufficiently safe for practical use. But our knowledge of how to accomplish this is exceedingly limited so far as most virus diseases are concerned.

In poliomyelitis the general problem of prophylaxis and therapy is particularly complicated by the fact that the infection involves a special group of cells, which, unlike most body cells, are not individually restricted to a small domain, but extend to points quite distant from their origin. We have involvement here of a system of cells which from the standpoint of bodily ramification is comparable to the blood and lymphatic systems, but within which the virus is much less easily reached than it would be if its distribution depended on these vascular systems.

Whatever our beliefs may be regarding the common portal of entry in the natural disease, direct communications exist between free olfactory endings in the vault of the nose and the vulnerable motor nerve cells in the central nervous system; a communication which may well be compared to a long tube, or rather to a series of tubes laid end to end from the vault of the nose to the distal end of the cord and within which the virus may migrate to the point of its main attack. It is this hypothetical tube and its easy accessibility in the vaults of the nasal passages which present the fundamental considerations in this disease, for I believe that we must accept that the results of experimental studies speak definitely for an axonal

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spread of this virus. Unless the relationships in the natural disease differ fundamentally from those in the experimental disease, which I personally doubt, it is obvious that the problem of controlling this disease is one of either preventing the initial access to this system of "tubes" or curbing its progression within the system once it has reached it.

Let us consider first the prophylactic aspects of the general problem. Mention has already been made of the rather obvious fact that the motor nerve cells in the medulla and cord are more or less directly linked with the nasal vault by a series of neurons, the most peripheral of which are the dendritic endings of the olfactory nerve in the nasal vault. Whatever other portals may exist, here certainly is the one and only place where a virus which is strictly neuronotropic in its properties can find unclothed and entirely unprotected neurons extending beyond the general surface of the body. It is true, of course, that we do not know whether the virus does actually enter these exposed endings directly, rather than at some point further on. All we know with certainty is that in intranasally inoculated monkeys the virus proceeds to the central nervous system by the olfactory pathway and under normal conditions does so only by this route. Whether this first stride toward the central nervous system is strictly axonal or essentially perineural, or both, remains to be definitely determined. In the absence of definite information on this point something in the way of a working hypothesis must be set up. If it is assumed that the virus first enters into a union with the free endings of the olfactory nerve, rather than at some more central point, the approach then is to find some way of preventing access to this exposed portion, either by destroying these endings or by modifying their permeability for the virus. Should the virus not enter these endings directly, but first pass through the olfactory mucosa and enter into association with the nerve at some point further on, the problem then becomes one of finding some way of preventing its passage through the mucosa itself. It is therefore something of a handicap not to know where entrance to the nerve is effected. Thus far, we have been unable to elicit any definite anatomic evidence that the olfactory dendrites or the olfactory cell bodies have been changed in any way by a supposed direct invasion, although it is easy to demonstrate cellular infiltration in and along the olfactory nerve filia, beginning with the smaller bundles of axones directly under the olfactory mucosa and ending in the outer zone of the olfactory bulbs. Indeed, such infiltrations are constantly present in animals infected by the intranasal route and become demonstrable within a day or two after virus is instilled intranasally.

These then are the theoretical considerations and the general objectives. It is my purpose to summarize briefly the results of our studies. In doing so I may state, without any further preamble, that it is now firmly established that it is possible to render monkeys fully resistant to intranasal inoculation by the application of certain chemical agents to the olfactory mucosa. Indeed, a number of different agents when employed in certain concentrations and when applied in such a way as to cover all or nearly all of the olfactory mucosa will convey a state of resistance which is often quite lasting. Among the more active agents are alum, tannic acid, picric acid, mercurochrome, thionin, neutral acriflavine, and especially zinc sulfate. There are others which are also effective, but less striking in the duration of their effect. The duration of the resistant state varies with the agent used, with its concentration, and

with the thoroughness of its application. I shall not enlarge on these factors, but consider rather what we know regarding the mechanism underlying the protection so induced.

It is, of course, entirely possible that not all agents which might be found to exercise a protective action would owe their effect to exactly the same general type of action. My remarks therefore apply only to those which we have studied in sufficient detail. Regarding these it can be said that the prophylactic effect which they individually produce rest on the same general type of action, differing only in degree. All of them owe their prophylactic effect to a destructive action on the olfactory mucosa. This may in places be superficial enough to include only the dendrites, so far as the olfactory nerve itself is concerned, or extend deep enough to reach the lamina propria and therefore to include the cell bodies of the olfactory nerve (olfactory cells). The damage may extend to all of the mucosa, or may be patchy in distribution, leaving portions of the mucosa entirely untouched, a fact which proved misleading in earlier work. Thus far all of the agents which have proved to be protective have been found to exercise a destructive action on the olfactory mucosa. This, of course, does not mean that prophylactic effects induced by chemical agents must necessarily depend on such a destructive action. If this were true no further work in this direction would be justified. It is still possible that there are chemical agents which may be employed either for their selective effect on the dendrites alone, or for some more general, but nondestructive action on the olfactory mucosa as a whole. More work must be done to cover these remaining possibilities.

There are certain aspects of chemical prophylaxis in monkeys which are of especial interest. One of these is the frequency with which animals rendered fully resistant become susceptible again. This return to a susceptible state may occur within a period of several weeks, or not until after several months have elapsed, depending somewhat on the agent used and the thoroughness of its application. The question is, what is the mechanism underlying this return of susceptibility? Since the most uniform and solid protection is afforded by agents which more or less completely strip the olfactory epithelium from the lamina propria one may well wonder whether the elimination of the olfactory neuron constitutes the only factor in the protection; in other words, whether the general structure of the new epithelium may also play a rôle. However that may be, when special staining methods are employed one can regularly demonstrate not only olfactory neurons in the olfactory mucosae of these re-susceptible animals, but show that infection in these animals is always associated with a round cell infiltration of the olfactory nerve filia and of the olfactory bulbs. Of course, these neurons are usually much less, widely distributed than in the mucosa of normal animals, but the fact that they have always been demonstrated in at least some portions of the mucosa and have always been associated with inflammatory infiltrations along the olfactory nerve filia seems to indicate the importance of an intact olfactory pathway in this return of susceptibility. There is a possibility that this restoration of susceptibility depends in part on a replacement of some of the olfactory neurons which have actually been destroyed, as well as on a regeneration of the dendrites of those cells which escaped destruction. This possibility is now under further investigation.

It would no doubt prove of interest to have the steps in the general repair of the olfactory mucosa discussed, but I must pass over this aspect merely with

the statement that the regeneration of the epithelium itself takes place rapidly and that the mucosa in time usually assumes a general appearance closely resembling the normal. I would like to insert at this point that the protection which is afforded to monkeys by zinc sulfate does not become fully effective until after the denuded lamina propria has been covered with a new epithelium, a process which requires 2 or 3 days. To this I may add that when infection is induced prior to this event, inflammatory infiltration may still be demonstrated along the olfactory pathway. This raises two questions: (1) Does the virus under normal conditions after all pass to the bulbs by the way of the perineural spaces rather than by the axones? (2) Is the return of susceptibility related to a gradual change in the new mucosa which ultimately makes it more permeable for the virus than it was during the earlier stages in its development? We are now endeavoring to obtain answers to these two important questions.

Summarizing this part of my paper, it is obvious that the results obtained thus far do not commend the use of chemical agents in the practical control of the disease in man, partly because of the risk of inducing a permanent impairment of the sense of smell, and partly because they imply that unless as extensive injury is induced in man as has been found to underlie the protection afforded to monkeys, little protection is likely to result. But, while it is clear that the results up to the present have little if any practical bearing, it is also true that the possibilities of chemical prophylaxis have not yet been fully explored.

I can only take time to say a few words about chemotherapy in acute poliomyelitis.

Theoretically, there are apparently two general ways in which a chemotherapeutic effect may possibly be realized: (1) by direct action on the virus, and (2) by the induction of such changes in the nerve cell as may serve to alter the pabulum necessary for the propagation of the virus or impede its migrations. The extraordinary resistance of the virus to various chemical agents, together with the unlikelihood that any chemical agent which actually entered the cell in a sufficient concentration to affect the virus might do so without injuring the cell, make the first of these two possibilities seem the more remote. During the past year we have tested the resistance of the virus *in vitro* against more than one hundred chemical agents, in such a way as to ascertain the relative effectiveness of the agents tested. Among the few agents which served to inactivate 1 cc. of a water clear virus suspension, containing 10–20 minimum infective doses of the virus, in dilutions of 0.1 per cent or less were the following: chrysoidine Y, congo red 4B, copper sulfate, hexylresorcinol, mercurochrome, mercury bichloride, oxyquinoline sulfate, potassium hydroxide, potassium permanganate, sodium formate, and trypaflavin. It is quite possible that there are substances which would prove active in higher dilutions. If so, these are most likely to be discovered by some such systematic survey as I have mentioned.

Therapeutic tests have been carried out with only one of the agents mentioned, namely, mercurochrome, the purpose being to defer such tests until after some highly active chemical had been found by *in vitro* tests, especially those which would in other respects be suitable for *in vivo* tests. In one experiment in which mercurochrome was administered intracordially to a group of 3 animals on 3 successive days preceding inoculation with virus intranasally (prophylactic application) all resisted infection, while all of an equal number of controls developed the disease. In another group, consisting of 4 animals,

in which the injections were begun on the day following intranasal inoculation, 2 animals escaped with only limited paralysis, while all of the controls developed extensive paralysis. Although we have not been able satisfactorily to confirm these results in subsequent experiments, they seem to suggest that it may be possible to accomplish something by means of agents which are expected to act directly on the virus in the infected tissue.

While our studies with virucidal chemical agents, applied therapeutically, have been limited, we have carried out a number of experiments in which it was hoped to gain a therapeutic effect by directly or indirectly modifying the vulnerability of the host. I can summarize the results of these experiments briefly by stating that artificially induced acceleration of the metabolism, the administration of such substances as vitamin B, viosterol and antuitrin S; of sulfanilamide, sodium sulfanilsulfanilate and sulfapyridine; also of several medicinal dyestuffs, used for their possible modifying action on the nervous pathways, all have failed to exercise any discernable therapeutic effect, though the treatments were started a day or two after the inoculation of the animals and were continued until paralysis appeared.

When we consider the problem of therapy during the acute stage of poliomyelitis it becomes evident that what is greatly needed to help point the way is information regarding the fundamental chemical processes underlying this disease. It is apparent that this aspect of the problem has been wholly neglected in our zeal for precise anatomic information and aspirations for immediate practical results. Therefore, in closing, I want to voice a plea for such studies, for it is apparent that we must dip more deeply into the basic processes of the disease if we are to proceed intelligently toward its control.

Studies of the Kahn Test

I. A Special Tube for the Preparation of Antigen Suspension

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THE standard method for mixing Kahn antigen suspension is to measure the antigen into one Kahn vial, the saline into a second vial, empty the saline into the antigen and as quickly as possible pour back and forth 12 times. There has been a twofold criticism of this procedure. First, it is

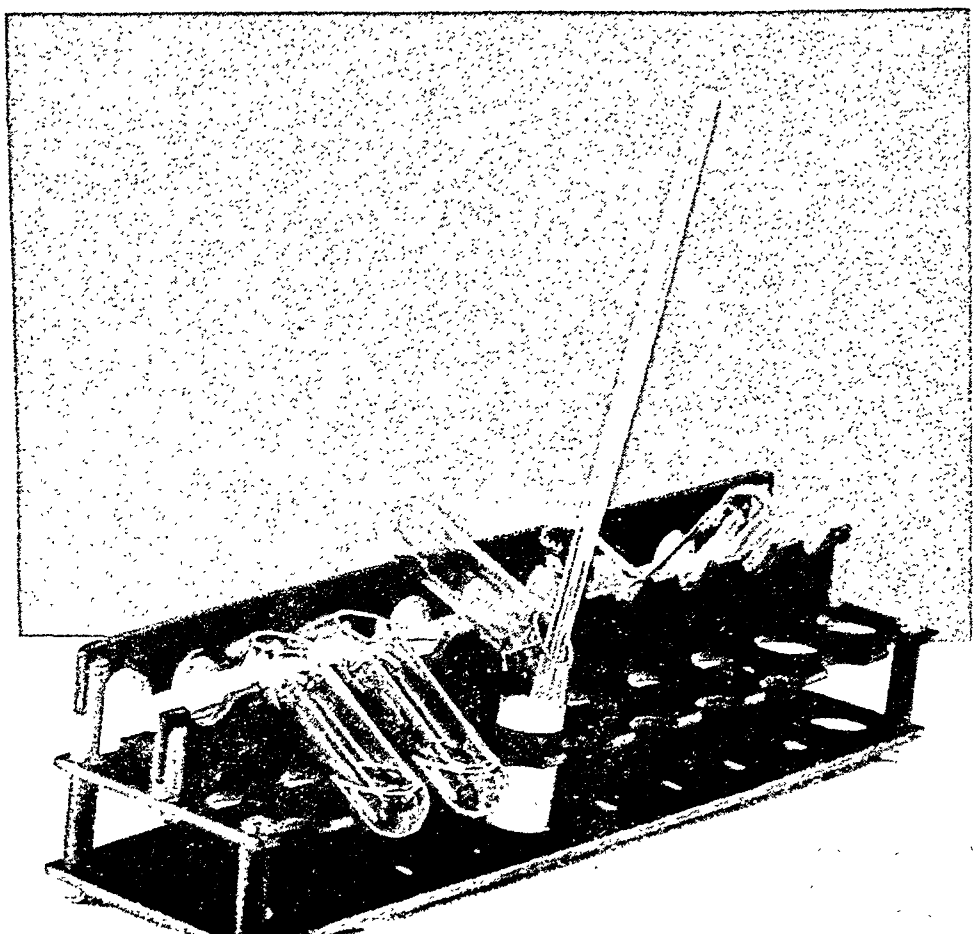

FIGURE 1—Special tubes and rack for the preparation of Kahn antigen suspension

practically impossible for even an experienced worker to make these multiple transfers of the solution from vial to vial without losing one or more drops; and second, because of the possibility of this spilling, different workers will vary the speed of mixing depending on their agility.

The loss of a few drops of the suspension after it has been thoroughly mixed is not of particular consequence. If, however, the loss takes place before the complete mixing of the antigen and saline the physical status of the suspension may be materially changed. The speed of mixing also alters the physical condition of the suspension in that there is a tendency toward an increased sensitivity as the speed of mixing is decreased. The first two or three transfers are definitely the most important in this regard. Presumptive antigen is more sensitive to these changes than standard antigen.

Spray[1] and Hinton[2] have each described methods of mixing antigen suspension in containers with separate compartments. Neither of these, however, is comparable to Kahn's standard method.

The use of the mixing tube described below permits standardization of the mixing of the antigen suspension without changing the fundamental principles of Kahn's method. The tube (Figure 1) consists of two arms each 5.5 by 1.5 cm. inside diameter at a 115 degree angle with an opening at the apex for filling and emptying. The opening is large enough to allow the entrance of a pipette and small enough to be easily covered when mixing. After the saline has been measured into one arm and the antigen measured into the other arm the suspension can be prepared by tipping the tube back and forth using the apex as an axis. A set rhythm can thus be employed in the mixing with no danger of losing any of the mixture.

For convenience a rack (Figure 1) may be used to hold the tubes during the pipetting of the saline and antigen, while the antigen suspension is being pipetted, and for draining after the tubes have been cleaned.

The cleaning of the tubes is accomplished by brushing in warm water containing a detergent and rinsing well in distilled water. If it is necessary to re-use immediately, follow the water rinsing with a rinse of alcohol.

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Recent Investigations of Goat's Milk*

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INCREASED interest in the use of goat's milk has prompted producers and consumers to seek more detailed information regarding the relative merits of this food. The composition and properties of goat's milk are likewise of concern to those whose duties require safeguarding our milk supply. Surprisingly enough, however, reliable information dealing with the chemical, nutritional, and bacteriological properties of this milk are generally lacking. Claims abound of special properties as well as deficiencies of goat's milk, but when reviewed critically they often prove to be impressions without the support of controlled experimental evidence.

A few years ago the Bureau of Animal Industry inaugurated an investigation, the purpose of which was to make a detailed study of the nutritive value and related factors which make goat's milk a desirable food for the infant as well as for general use in the human dietary. Such a problem, if carefully controlled entails, in addition to the usual analyses, considerable experimental feeding work where results are evaluated largely in terms of their comparative values with other foods. Human milk being unavailable, cow's milk was used as a basis of such comparisons. This provided a suitable control as well as an intelligent appraisal of the value of goat's milk in light of accepted standards for cow's milk. Results of the study have recently been published.[1]

Among the milk goats in this country the Toggenburg and Saanen breeds are the most numerous. In milk production and percentage of butter fat they occupy the same relative position among milk goat breeds as do the Holstein cows among the dairy breeds. Furthermore, these high producing animals supply a large part of the goat milk coming to the attention of public health officials. Since Saanen and Toggenburg goats provided the milk for this study, a critical review of the goat milk data of the experiment as well as its evaluation in terms of Holstein cow's milk would appear to be of particular interest at this time.

Goat's milk for these studies was supplied by the bureau's milk goat herd, located at Beltsville, Md., which consisted of both purebred and high grade does, in approximately equal numbers of the Toggenburg and Saanen breeds. The cow's milk was furnished by a nearby pedigreed Holstein herd. The milks were considered representative of their breeds and were produced in accordance with approved dairying procedures. Preliminary investigation failed to reveal differences in the chemical composition between the milk of the two goat breeds, consequently in this study their milk was pooled.

* Read before the Food and Nutrition Section of the American Public Health Association at the Sixty-eighth Annual Meeting in Pittsburgh, Pa., October 19, 1939.

RESULTS

GENERAL COMPOSITION

In Table 1 is presented the average composition of the goat's milk and Holstein milk studied. Attention is called to the figures representing the general composition of the two milks. That these milks are so nearly alike in their content of water, lactose, fat, protein, and ash prompts one to examine carefully the make-up of their constituents in a search for differences attributable to animal species.

Proceeding in this manner we find little difference in their inorganic constituents. Like other milks they are both low in iron and copper but with probably a satisfactory content of calcium and phosphorus. Among the nitrogen fractions, however, goat's milk contains a comparatively high content of albumin and nonprotein nitrogen, surpassing both cow's and human milk in this respect. Expressing these results in percentages of the total nitrogen, however, produces larger protein values for human milk due to the small amount of casein present.

The vitamin figures represent average results expressed in International Units. Goat's milk appears to have a comparatively high potency of vitamin B_1, with values for other vitamins well within the range reported for cow's milk. In the absence of international standards for vitamin G (riboflavin), results with this vitamin are not included in the table. However, on the basis of controlled feeding trials goat's milk was found to be relatively high in the content of this vitamin. In the amounts consumed, both goat and Holstein milk failed to be adequate sources for the prevention of scurvy in guinea pigs, and subsequent work indicated only approximately 25 I.U. of ascorbic acid in goat's milk. No measurable amounts of vitamin E were found in goat's milk. Probably of equal interest to the high vitamin B_1 content of goat's milk is the fact that despite the white color of its butter fat, it contained as much

TABLE 1

Average Composition of Goat's Milk (Toggenburg and Saanen combined) and of Holstein Cow's Milk

Milk Component	*Source of Milk*	
	Goat	*Holstein*
General Composition	*Per cent*	*Per cent*
Water	88.29	88.19
Lactose	4.55	4.59
Fat	3.5	3.4
Protein	3.10	3.17
Ash	0.79	0.70
Inorganic constituents	*Mg./100 cc.*	*Mg./100 cc.*
Calcium	114.0	106.0
Phosphorus	98.0	88.0
Iron	0.068	0.072
Copper	0.053	0.057
Nitrogen fractions *	*Gram/100 cc.*	*Gram/100 cc.*
Casein	0.3639	0.3811
Albumin	0.0679	0.0467
Globulin	0.0425	0.0443
Nonprotein	0.0419	0.0316
	International Units per 100 Grams	
Vitamins		
A (butterfat)	2,500	2,500
B_1	28	16
C	25	
D	7.4	7.9

Milk Component	*Source of Milk*	
	Goat	*Holstein*
Fat acids in butter fat	*Per cent*	*Per cent*
Saturated (total)	70.0	63.3
Palmitic	34.4	28.5
Myristic	10.4	12.6
Stearic	7.8	12.1
Caproic	7.2	3.6
Lauric	3.9	2.3
Caproic	2.5	1.1
Butyric	2.4	2.4
Caprylic	1.4	0.7
Unsaturated (total)	30.0	36.7
Oleic	25.2	30.5
Hexadecenoic	2.7	3.3
Arachidonic	1.5	1.6
Tetradecenoic	0.4	1.1
Decenoic	0.2	0.2
Digestibility factors		
Surface tension	52 dynes	51.5 dynes
Curd tension	36 grams	52 grams
Maximum buffer index	.043	.035
Volume of fat globule	1.12 μ^3	2.25 μ^3

* Determined on fat-free basis

vitamin A as did the much more highly pigmented butter fat from Holstein cow's milk.

The figures in Table 1 representing the fat acids in the butter fat of Holstein cow's milk are well within the limits reported by other investigators. On the other hand a significant difference between goat's butter fat and cow's butter fat appears in the greater quantities of caproic, caprylic, and capric acids found in the former. These acids are the steam-volatile, water insoluble acids chiefly concerned in the Polenske numbers, and may be responsible for the odor and taste claimed by some to be characteristic of goat's milk. Certain European investigators have attributed the higher Polenske number of goat's butter fat as the cause of the observed anemia in infants fed goat's milk, a theory unconfirmed in our experiment judging by the urobilin output of several infants fed goat's milk fat.

Among the so-called digestibility factors which were measured, goat's milk shows a normal surface tension, a soft curd, small-sized fat globules and a rather high buffer index. Compared to Holstein cow's milk, curd tension values and the volume of the fat globule are considerably less in goat's milk with a higher maximum buffer index, approaching that of Jersey cow's milk.

Thus in summing up the average composition of the milk from Saanen and Toggenburg goats, one is impressed with its similarity to that of the milk from the Holstein cow. Species advantages possessed by goat's milk over cow's milk as a result of this investigation lie principally in a few constituents, such as larger amounts of albumin and non-protein nitrogen, greater quantities of vitamin $B_{(1)}$, a softer curd, and smaller-sized fat globules.

FEEDING COMPARISONS

Goat's and cow's milks were fed to goat kids and rats under controlled feeding conditions in an effort to determine the relative nutritional value of these two milks. Briefly, these results indicated little difference between the mixed milk of the Toggenburg and Saanen goats and that of the Holstein cow as a source of food for these animals. Gains in weight took place in proportion to the total energy contained in the milks, irrespective of the type of milk or its composition. This was found true of boiled milks as well as raw milks. Exclusive diets of either goat or Holstein milk were followed in time by the development of nutritional anemia in both kids and rats. It was found that this condition could be corrected or prevented by suitable iron and copper additions to the milks, and bears out the fact that both of these milks are deficient in iron, as shown in Table 1.

Results of feeding 4 babies goat's milk and 3 babies Holstein milk over a period of 12 weeks under strictly controlled conditions provided additional evidence that gain took place with either milk in direct proportion to the nutrients consumed. These babies were between 5 and 7 weeks old and averaged 7½ pounds when placed on the milk diets. An attending physician and 2 trained nurses cared for the infants during the experimental period, and the caloric intake of each infant was computed daily.

Regarding the feeding comparisons with babies it should be borne in mind that no consideration was given to the unwell infant or the child having idiosyncrasies to cow's milk. The opinion that goat's and Holstein milk do not differ in their nutritive value is based on results with healthy individuals who were otherwise normal to the extent that either goat's or Holstein milk was assimilated with equal ease.

BACTERIOLOGICAL ANALYSIS

In addition to such factors as the

composition and nutritive value of goat's milk consideration should also be given to its bacteriological properties when attempting to evaluate this milk as a source of food. The writer and his associates were able to produce goat's milk over a 27 week period which had an average daily plate count of slightly over 1,300 colonies per cc. after bottling. This raw milk was produced under normal dairying conditions, which included such procedures as proper sterilization of milking utensils, adequate coöling facilities, and the usual sanitary precautions involving both milkers and goats. Furthermore, an analysis of the milk aseptically drawn from 23 goat udders revealed that less than 40 per cent of the teats examined appeared to secrete milk containing bacteria, and then usually in comparatively small numbers. This finding would explain to a large extent the observed low count found in market goat's milk.

Goats are considered to be comparatively free from tuberculosis. Furthermore, while outbreaks of Malta fever traceable to goats have been reported in this country, the goat herd supplying the milk for the experiments herein discussed have, upon the several occasions when they were tested, reacted negatively to the presence of the *Brucella melitensis-Brucella abortus* group of microörganisms. These facts together with the evidence of a low bacterial count of the milk should not make it difficult for goat milk producers to meet the usual requirements of public health officials for the production of milk.

SUMMARY AND CONCLUSIONS

Milk from the Toggenburg and Saanen breeds of goats has been found to be a healthful, nutritious food, not unlike the milk from the Holstein breed of cows in general composition and nutritive value. The goat's milk studied had an average curd tension considered to be within the upper limits of soft curd milk, possessing values indicating a curd 31 per cent softer than that of the milk from Holstein cows. A small-sized fat globule of one-half the volume occupied by the fat globule of Holstein milk appeared as another outstanding species difference between the two milks.

The apparent ability of goats to produce milk exceptionally low in bacterial numbers operates in its favor when milks are appraised on the basis of their microbial content.

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FOUNDATION AND GROWTH OF PUBLIC HEALTH

IN following changes in society and advances of the science and art of preventive medicine and public health, the interesting backgrounds of these developments deserve study. Furthermore students who are preparing for careers in public health administration need to become acquainted with the pioneer contributions of public health statesmen in America and abroad, even consulting the original publications and having time to peruse them.

In this issue of the JOURNAL is reviewed a significant contribution * which will stimulate reading of the "classics in public health." The author, the first Chief Medical Officer to the Board of Education and afterward to the Ministry of Health in England, has ably described and critically evaluated the public health movement in his country. In emphasizing the importance of considering the foundations, he states that we cannot set out upon this journey in health policy without understanding the beginnings. "For the 'practical man' who builds a house without a plan we should count a fool, and no such plan is of any use which is not designed on architectural experience and with its purpose clearly in mind. Hence the approbation of history and philosophy is essential not only to actual building but to an understanding of the why and wherefore of what has gone before."

The advent of the public medical services as well as their successful administration involved the Civil Service. It is also noteworthy that with the extension of the scope of public health there was a demand for fuller coördination centrally between all the departments directly or indirectly concerned in national health. The features of an organized scheme of national health, of which a Ministry of Health is a part, "in this, or any other, democratic State," are listed as follows: (1) a central supervising department or Ministry representing Parliament; (2) local authorities or representative local bodies for discharging the duties imposed on them by Parliament; (3) voluntary societies and agencies contributing

* *The Building of a Nation's Health*, by Sir George Newman. Macmillan and Co., Limited, London, 1939. See p. 190.

of their free will assistance and aspiration, and coöperating closely with the official organization; (4) the medical practitioner, an integral and active force upon whom Parliament has imposed initial statutory duties, private and public; and (5) an educated people able and willing to practise the way of health.

Widespread improvement in nutrition during the last twenty years is recorded as due to social betterment and taste, to the commercial availability of food supplies, to increased consumption of food, and to effective public assistance for the necessitous. The provision and results of a more complete public service for relief are said to have been vindicated by the absence of widespread or serious malnutrition. Public health has likewise been a contributing factor in the larger life and opportunity which the people enjoy.

In estimating the work of the health insurance system in England, recognition is given to certain limitations. It is a practitioner service only, still without a consultative and specialist element or desirable facilities and personnel for observation, while provision for coöperation between insurance committees and sanitary authorities is reported as ineffective. But evidence indicates that "panel treatment" is improving and that the insurance system is becoming more effective and universal. "Its value will increase as it is more and more closely coördinated, if not unified, with the other public health services of the nation."

TYPHOID VACCINATION

A RENEWED interest in typhoid vaccine and typhoid vaccination will be the result of the recent publication, by Colonel J. F. Siler and his associates of the Medical Corps, U. S. Army, of their investigations carried on over several years. The work will stand as an example of the way a study should be planned and executed, regardless of the importance of the results. The investigations have resulted in marked changes in the Army typhoid vaccine. The time-honored Rawlings strain used in English speaking countries since typhoid vaccination came into vogue about 30 years ago has been replaced by a new strain, No. 58, which is regarded as of better antigenic activity. The changes in the technic of preparation and of testing need not be discussed here.

The old concept that strains of organisms of the same species are practically identical has been much revised in recent years, and the composition of the antigen is of great, perhaps of determining, importance.

It has been proved that virulence of a strain and immunizing ability run parallel to a considerable extent. Compared to the one in use previously, No. 58 is a very virulent strain. Very important is the observation that often, when immunity wanes with the passing of time, the intracutaneous administration of a small dose of the vaccine will restore protective antibodies to a high level. This of course greatly simplifies re-immunization. While the new vaccine doubtless is an improvement over the old one it is to be pointed out that the old vaccine had behind it a creditable record of usefulness covering many years as applied in military and civil life. The evidence as to the superiority of the new vaccine, though very suggestive, is practically all experimental, and it awaits an extensive field trial before a final appraisal as to the prophylactic value is to be made. Colonel Siler appreciates this, and in his summary remarks: "Decision as to the superiority in protective properties of vaccines prepared with virulent strains over those formerly used (avirulent strains) will be contingent on the results obtained

in the prevention of typhoid fever in large groups of immunized individuals. It should be possible to obtain the answer to this question within the next two or three years through observation of the occurrence of typhoid fever in the Civilian Conservation Corps."

Experience has shown that the typhoid vaccines hitherto in use have been highly successful in military practice, but under conditions of civilian application there seem to have been many examples of failure. Ordinarily it is very difficult to appraise the value of any new biologic prophylactic agent under conditions of use among a civilian population.

Probably the medical profession has expected too much of typhoid vaccination. There are instances where physicians have excluded a diagnosis of typhoid fever on the ground that the patient has been vaccinated within a year or two. This is not justified and we doubt that a history of vaccination should be given any great weight when confronted by a diagnostic problem in this field.

Two primary considerations confront the health officer in reaching a decision as to the application of any public health procedure, and this applies especially to biologic prophylactic measures. First must be considered the absolute protective value—smallpox vaccination would be rated as almost, if not quite, 100 per cent effective; influenza vaccination as of no value. The other protective inoculations stand somewhere between these extremes; typhoid vaccination in a civil population possibly stands not above the middle in any scheme of rating. The second consideration has to do with the question of whether the time, effort, and money expended on the prophylactic measure are likely to give a return commensurate with the outlay.

Applied to typhoid vaccine, it is plain that where the incidence of the disease is as low as it is in most of our cities we would not expect to undertake a program of vaccination. Bridgeport, Conn., Utica, N. Y., Fort Wayne and South Bend, Ind., and Minneapolis, Minn., had no typhoid deaths among residents in 1936, 1937, and 1938; obviously, in those places, typhoid vaccination is not to be advised. Whether to apply vaccination in a general community with a death rate even as high as that of El Paso, Tex., in 1938 (5.9 per 100,000) is a problem each health officer must decide for himself. If the prevalence of the disease is high, or there is a threat of serious exposure, as among military personnel, typhoid vaccination may be expected to give protection that will justify its adoption.

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THE SURGEON GENERAL'S LIBRARY

FOR years there has been agitation over a suitable and fireproof building to house what is generally known as the Surgeon General's Library. We have called attention to this,[1] giving in full also the resolutions passed by the Medical Library Association,[2] urging sufficient funds to sustain this great work.

It is heartening to note that President Roosevelt has recommended the acquisition of a site for a new Army Medical Library and Museum building in Washington in his budget for 1941, which was submitted to Congress on January 4 of this year. In this budget $600,000 is recommended for the purchase of a site and preliminary expenses in connection with the building. The site of

selection is on East Capitol Street adjacent to the Congressional Library group. The budget which contains this item is now before the Committee on Appropriations of the House of Representatives.

It will be recalled that the 75th Congress authorized such a building at a cost of $3,750,000 but failed to make an appropriation for the purpose, consequently their action was without effect.

We have in Washington the greatest medical library in the world, but its housing is very deficient. While the term " medical " is used, it must be remembered that this library contains full files of books and journals on public health, and it is just as essential to public health workers as it is to the medical profession in general. Our Association is just as much interested in it as is the American Medical Association, for example.

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Supplement to March Journal

Diphtheria Carrier Survey

made by the
Diphtheria Immunization Study Group
of the

Sub-Committee on Evaluation of Administrative Practices
of the
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BOOKS AND REPORTS

The Building of a Nation's Health —*By Sir George Newman. London: Macmillan,* 1939. 479 pp. Price, $6.00.

" How statecraft and medical knowledge took counsel together " at the opening of a new epoch of preventive medicine is the theme of this stimulating record of growth of the complicated machinery which controls national health, of the reasons for the shape it has taken, and of the leaders in the developments in Great Britain. The book is divided into 14 chapters, the first of which describes the foundations of modern public health. Then follow chapters dealing with medical education, the creation of the Ministry of Health, functions of local government, various features of public health and preventive medicine, measurement and a look forward, with a concluding account of the part played in the movement for a quarter of a century by Sir Robert Morant.

The author considers the laying of the foundations of the modern English system of a public health service in three periods: the pioneering state from 1832 to 1888; the Local Government Board regimé from 1869 to 1900; and the modern period from 1900 to 1939. Commenting upon the changes in this generation, " even more profound than those which altered the social history between 1832 and 1890," the author states that " ' the centre of gravity ' of public health governance has moved from the importance and effect upon mankind of a sanitary environment to the uncharted liabilities and obligations inborn in the nature of man's body itself. The wisdom of the body and its physiological law has been unveiled in our own time and has thrown new light upon its health and disease, changing both the approach to and the purpose of preventive medicine."

The principal milestones in the English national health system, " building itself step by step, growing up by necessity rather than superimposed by law," are listed in the following order of events: sanitation, hospitals, isolation, public water supply, industrial health, notification of infectious diseases, registration of causes of death, vaccination (as the first form in England of communal immunity), the control of a wholesome food and milk supply, housing reform, the public medical services (including public assistance and medical treatment). The significant public services of Edwin Chadwick and of Sir John Simon, and the effects of the Public Health Act of 1848 creating the General Board of Health (expressing for the first time the conviction of Parliament that the State is directly responsible for the health of the whole people) are discussed in a manner to emphasize the importance of a central health authority with a medical department and with proper freedom of local government. William Farr's work as medical statistician

> . . . led directly to the converging point of action and to the elucidation of the cause of excessive mortality. The annual decennial volumes issued by the Registrar-General summarizing and classifying all the death certificates may look dull, dry, and meaningless to the uninitiated reader, but they are the " Domesday Book " of the modern age, the vital returns of a people, the real life budget and mirror of their physical condition. A national health system not established on such data but on some temporary salvage or emergency endeavor is unreliable, empirical, ephemeral and possibly capricious.

Referring to the profound and arrest-

ing effect of the cholera invasions, the Poor Law reform, Chadwick's revolutionary report, the Towns Commission, and the history of the Board of Health, the author reminds us—

> that in practical politics lasting results are not accomplished by the operation of single forces or issues, but only by converging energies and the trend of political opinion. Here a little, there a little, here one means, there another, and progress happens.

And recalling the acceptance of the ideas of vaccination, anesthesia, antiseptic surgery, and the causation of infective disease,

> when the people understand science, and when they receive the succour which it brings, their answer is as clear as daylight.

After pointing out that an essential feature of a national health system is the existence and competence of the medical profession, the creation by Linacre of the Royal College of Physicians and the important rôle of the General Medical Council are described, followed by an account of the development of a new spirit in medical education. While a program for the postgraduate instruction of medical practitioners was formulated by the Athlone Committee of 1921, the project was given impetus by the establishment of the London School of Hygiene and Tropical Medicine.

> Out of postgraduate study in the past has come nearly every great advance in medicine. What is novel today is the new knowledge combined with the insistent claims of the new world—social, economic. communal. For both these circumstances give new direction to public medical needs—nutrition, immunisation, health education, physiological assessment, physical welfare, insurance. Postgraduate study will obviously include all that pertains to the science and art of medicine, and the cultivation of the health and capacity of the normal man.

Cultural study should also include other subjects listed, as for instance: the history of medicine, social science, the genesis and history of the public medical services, and the great medical biographies.

Space does not permit of a detailed review of chapters rich in history and basic information dealing with the work of the Ministry of Health and of local authorities, or with programs in school health including special classes and schools, in physical education and recreation, in maternal and child health, in nutrition, in industrial hygiene, and in health insurance and medical research. For the future, the author effectively stresses the need for better application of knowledge by the State and its wider usage by the people. This valuable contribution by an outstanding public health statesman should be made available not only to public health administrators but to every student of public health.

IRA V. HISCOCK

The Patient as a Person: A Study of the Social Aspects of Illness—*By G. Canby Robinson, M.D., LL.D., Sc.D. New York: Commonwealth Fund,* 1939. 423 pp. Price, $3.00.

The history of hospitals may be divided into four periods. During the first, which extended through the Middle Ages, the primitive hospital or hospice was merely a benevolent home for the sick where they might rest until they recovered or died. During the second, the beginning of which might be credited to the Renaissance, surgical and medical therapy, and later laboratory services were introduced to facilitate recovery. The third period began with the introduction of trained nursing service. The last or modern represents the most significant development in our changing conception of the functions of a hospital. This development is founded upon the increasing realization that illness is largely conditioned by environmental and social factors, and that the care of the sick in hospitals is incomplete unless it includes a serious

effort to discover and to correct these important determining influences.

Because of the increasing complexity of the scientific services, hospital physicians have been able to concern themselves very little with the development of the nursing services and often not at all with the newer social service activities of the modern hospital. These important responsibilities have therefore been relegated to a specialized nonmedical staff of social workers, who function almost independently on the outskirts of the clinical services of the hospital and the outpatient clinic.

The volume is interestingly written around 174 case histories, most of which portray the sorrows and tragedies of the poor. In simple language and without any attempt at moralizing, the 174 case histories paint a composite picture of American life among the underprivileged, yet this is apart from the primary purpose of the report, which effectively reveals what Minot and others have called " the social components of medicine."

It is apparent that Dr. Robinson's interest in this subject was primarily stimulated by the growing influence of modern psychiatry on medicine. Some of us have always believed that two major influences were responsible for recasting the functional responsibilities of the hospital into the modern mold, the growth of psychiatry, and the rapidly enlarging field of preventive medicine, of which mental hygiene is a part.

Members of the American Public Health Association will find the last chapter on " the Treatment of the Patient as a Whole " especially interesting. Here Dr. Robinson describes his recommendations for focusing the attention of physicians on this important aspect of the care of the sick. The evangelical work is begun in the third year of the medical school, each student being assigned to study at least one patient as a total individual, and to present a report at one of the informal weekly conferences attended by 25 students assigned at that time to the medical outpatient clinic. It will interest public health workers to learn that the conferences are also attended by the public health administrators of the Eastern Health District of Baltimore, by visitors from the Baltimore department of health, and from the Johns Hopkins School of Hygiene and Public Health, as well as by a psychiatrist, medical social workers, and representatives of outside social agencies. The opportunity to see the patient in his home environment, enables the student to consider the case as a human as well as a medical problem. Aside from observing the relationship of the various social agencies to medical care, " the method of teaching serves to introduce the student to phases of hygiene and public health as related to clinical medicine and to demonstrate the integration of medical practice and public health." It is especially valuable that this opportunity should come at the very beginning of clinical training so as to leave a vivid and permanent impression upon the mind of the student which may be carried into the work of the fourth year and of the interneship and, it is to be hoped, on into the private practice of medicine or hospital work. As Dr. Robinson states, " If the family physician can be adequately trained and satisfactorily established, he will form the first line of attack in the battle of mental hygiene, preventive medicine, and public health."

Dr. Robinson realizes the futility of expecting the sustained interest of busy hospital clinicians in the daily routine revelations of the medical social workers. They are the fact finders but they require medical leadership which they usually fail to receive. In accordance with the plan evolved by Dr. René

Sand at the University of Brussels, Dr. Robinson advocates the establishment at hospitals of a special department covering the social aspects of illness, which should operate beside the clinical departments in coöperation with all their directors and chiefs.

Two quotations give the keynote on which the volume ends, and with the author's cautious views concerning the future trends in medical practice:

"There are traditions and patterns in medical service, fostered by the medical profession throughout its long history, which must as far as possible be retained, for they are based upon enduring human characteristics." "The temperament and personal characteristics of both doctor and patient are significant, if the relationship is to be intimate and personal, and provision for free choice and easily affected changes must be preserved."

The Commonwealth Fund deserves commendation for its support of this work. If it will be widely read by hospital physicians, medical school faculties, public health administrators, and above all by general practitioners, it will enlarge the social vision of medical men by reminding them that care of the sick cannot be divorced from the general problems of the world we live in.

George Baehr

Pneumonia: With Special Reference to Pneumococcus Lobar Pneumonia—*By Roderick Heffron. New York: Commonwealth Fund,* 1939. 1086 pp. Price, $4.50.

This volume completes the trilogy which has resulted from the Massachusetts Pneumonia Study and Service inaugurated by Dr. George H. Bigelow. These are *Lobar Pneumonia and Serum Therapy* (called in its revised edition, *Pneumonia and Serum Therapy*) by Lord and Heffron, the *Biology of Pneumococcus,* by Benjamin White in collaboration with Robinson and Barnes, and the present volume. Supported and published by the Commonwealth Fund, each of these contributions to our knowledge of pneumonia is complete in itself—so complete, in fact, as to constitute practically exhaustive repositories of knowledge in its field up to the date of publication.

This volume discusses the disease, pneumonia, with special reference to pneumococcus lobar pneumonia, and is therefore a practical reference handbook for the epidemiologist and the clinician. That it may be complete, chapters are devoted to the causative organisms of pneumonia (including those forms not due to pneumococci) and to the pathogenesis and the pathology of lobar pneumonia; a chapter is also devoted to experimental pneumococcus infections. Diagnosis and serum therapy treatment are thoroughly discussed—but not to the neglect of the newer chemotherapeutic agents. Review of the observations that have been made upon the use of sulfanilamide and of sulfapyridine seem to have been included up to the minute of going to press.

One of the most attractive chapters, especially from the standpoint of the investigator and the teacher, is called "Continuing Problems." The special interest of public health administrators will be drawn to the section of this chapter which concerns pneumonia programs; this outline is based upon the author's broad experience in Massachusetts.

In an appendix is given information relating to the Massachusetts Pneumonia Study and its continuing program. This was begun in 1931 and it is still receiving the active support of the state.

The book is attractively made and excellently printed. The diction is clear and direct; it is the style of a trained and interested investigator thoroughly equipped to select and synthesize pertinent information from all sources. There are a bibliography of 1471 references and an index of 61 pages.

A. P. Hitchens

Tuberculosis and Social Conditions in England: With Special Reference to Young Adults—*By P. D'Arcy Hart and G. Payling Wright. London: National Association for the Prevention of Tuberculosis,* 1939. 165 pp. Price, $1.00.

Respiratory tuberculosis mortality among young adults, both in England and the United States, has failed to decline as rapidly as has the tuberculosis death rate for other ages. This publication reports an interesting study into the reasons for this condition in England with special investigations in the London area. The set-back to a formerly satisfactory decline has been particularly evident among young women, whose pulmonary tuberculosis death rate, per 100,000, fell from 276 to 112 in the 30 years between 1871–1880 and 1901–1903, but showed practically no further decline during the next 30 years, being 107 in the period 1911–1913 and in the period 1931–1933. Nearly half the deaths from all diseases among young women, aged 15 to 24, are due to pulmonary tuberculosis.

In their search for causative factors, the authors have investigated the standard of living, employment, local poverty, housing, nutrition, and the migration occurring from one part of the country to another. For the country as a whole a correspondence is demonstrated between average real earnings of the working class and pulmonary tuberculosis mortality during the past 90 years. This relationship is closer for young adults than for any other age. The authors believe the retardation in the decline of the pulmonary tuberculosis death rate among young adults is due in part to the contemporaneous slowing in the improvement of the national standard of living and to the special sensitiveness of young people to unfavorable social conditions.

Two further social changes are thought to have been influential. One of these is the rather prolonged check to the reduction of overcrowding. The percentage of persons living more than two to a room was actually greater in 1921 than in 1901 or 1911. Since that time housing has been improved. The other social change is the marked rise in the employment of young women, particularly in industrial occupations with the accompanying strain and fatigue, and the increased number of contacts.

The failure of the tuberculosis death rate of young adults to decline has been more noticeable in the large urban areas than in the rural districts, and most noticeable in those boroughs with severe poverty and inadequate housing.

C. E. TURNER

Your Experiment in Living—*By Michael Ardagh Cassidy, M.D., and Helen Gay Pratt. New York: Reynal & Hitchcock,* 1939. 153 pp. Price, $1.75.

This book is described by the authors as a "friendly talk" and was designed originally for a certain adolescent. It is intended as a basis for discussion between parent and child rather than as a textbook for general use. The authors call attention to the fact that many excellent books for younger adolescents have been written but believe that this is the first time that the matters contained in this volume have been discussed for the later adolescent with the more nearly mature mind. It is their opinion that at this period mind and body do not keep pace with each other and their purpose is to give to these young people an understanding of the changes which are taking place so that the passage into full maturity may be as painless as possible.

The book assumes that the readers will have received some instruction in physiology and will have picked up a

lot of "heterogenous information unrelated and perhaps unreliable."

The object of the book as set out by the authors appears to have been adequately fulfilled. The great point is that they give here in clear and simple language facts about which there is always curiosity on the part of both boys and girls and which perhaps more often than not are discussed carelessly, inadequately, and even in a vulgar manner by persons not qualified to speak. The little volume can be recommended as among the best of its type. MAZŸCK P. RAVENEL

Medical Microbiology—*By Kenneth L. Burdon, Ph.B., Sc.M., Ph.D. New York: Macmillan,* 1939. 763 pp. Price, $4.50.

The present work on microbiology is the outgrowth of an earlier book by the same author which was intended primarily for nurses, and even in the volume under review there remains evidence of the emphasis on the rôle of the nurse in the care of the sick and in the prevention of sickness. However, it is admirably adapted for those who require a much more extensive acquaintance with the subject, chiefly medical students and physicians.

Part I is devoted to the fundamentals of microbiology; Part II largely to methods; Part III is entitled "Infections and Resistance," but it embraces much more than these terms imply; Part IV deals with groups of infections and with individual diseases considered chiefly in relation to the regions of the body primarily involved. The Appendix covers approximately 70 pages of detailed matter (methods and tests) which is better presented in this form than it would be in the text proper.

Although the author makes acknowledgment of some aid received from professional colleagues, the whole book is essentially his own work; there are no sections or chapters written by others. The subjects are in general excellently covered and the book is second to none in the field. The sections dealing with the applied aspects of bacteriology are concise and accurate and especially sound from the point of view of preventive medicine; for example, the discussion of the control of diphtheria (p. 481) could scarcely be improved. The portions of the article on tuberculosis which deal with prevention are brief but adequate.

When we turn to the section on anaphylaxis and hypersensitiveness (p. 417) it is most refreshing to find that the author carefully distinguishes between the reactions in man and those in animals, and emphasizes the fact, so often overlooked, that in man the first injection of a foreign protein may lead to a severe anaphylactic reaction.

As examples of incorporation in the text of recent advances one turns to typhoid vaccine (p. 562) and finds mention of the newer antigen (Army No. 58); to encephalitis and finds human encephalitis mentioned in relation to encephalomyelitis in horses (p. 626); to yellow fever and finds jungle yellow fever (p. 629) concisely discussed; to coccidioidal granuloma (p. 639) and finds reference to the respiratory type of the disease and the relation of the infection to certain erythema nodosum-like lesions. These and similar instances are evidence that the author has embodied the latest useful information available at the time the book went to press.

There are a few defects and omissions: Description of the test for sterility of a bacterial vaccine (p. 406) is inadequate; a negative culture result with one loopful of the vaccine is not nearly sufficient to establish sterility.

Under "Complications" (p. 623) of prophylactic vaccination against rabies the author fails to mention "Treatment Paralysis"; no mention is made of occasional infections of tetanus and en-

cephalitis that may follow smallpox vaccination. The intraspinal use of tetanus antitoxin is advocated, though this method is in less favor than it was earlier.

This leads one to say that although the author is not a clinician the clinical suggestions and recommendations throughout are usually well founded. One sums up an estimate of the book by saying that it should be valuable for teachers and students of bacteriology when the subject is considered from the point of view of human pathology.

GEORGE W. MCCOY

Principles of Medical Statistics—*By A. Bradford Hill (2nd ed.). London: Lancet,* 1939. 189 pp. Price, $2.25.

This is an excellent book on elementary statistics. The principal change in this edition is the inclusion of a chapter on the usual methods of calculating standardized death rates. Although originally written for the physician, it provides for the public health worker a good introduction to the field of medical statistics.

There are 18 chapters, and among the subjects treated are selection, presentation, variability, standard deviation, averages, sampling including a discussion of chi square, correlation and life tables. One of the interesting features of the book is the three chapters devoted to common fallacies and difficulties, which are full of practical advice. Included in the appendix are three pages of definitions and formulae and a two page table of chi square.

The first edition, originally drafted at the invitation of the editors of the *London Lancet* was intended to acquaint the physician with an elementary statistical technic. It appeared serially in that publication and the acclaim that followed prompted the editors to issue the articles in book form.

LOUIS FELDMAN

Economical Administration of Health Insurance Benefits: Studies and Reports, Series M (Social Insurance), No. 15—*Geneva and Washington: International Labour Office,* 1938. 332 pp. Price, $1.75.

This timely publication deals systematically with problems of great importance for social insurance and for public health agencies. It is divided into three parts: (1) the principle of economy in administration of health benefits, (2) the principle of economy in national laws and regulations, and (3) documents of an international character. A useful bibliography is included.

In part one, of special interest to health administrators, are considered the principles of economy and its general application in sickness insurance funds, the work of health insurance fund physicians, application to therapeutics, and the preventive aspect of the problem. Consideration is given to institutional treatment and the assessment of disability, and to the preventive possibilities open to the physician, especially in guarding against and treating chronic tuberculosis. Examples are drawn from daily medical practice.

IRA V. HISCOCK

Textbook of Healthful Living—*By Harold S. Diehl (2nd ed.). New York: McGraw-Hill,* 1939. 634 pp. Price, $2.50.

Dr. Diehl has thoroughly revised and enlarged his first edition of *Healthful Living,* and has added timely chapters on "Modern Parenthood," "Community Health" and "Organized Health Work." The volume has been recast into a convenient form for textbook use with discussion suggestions and references at the end of each chapter. The book has preserved its lucid style and helpful divisions of subject matter. The appendix consists of tables of standard weights, nutritional values

of various foods, report of the Sub-Committee on Communicable Disease Control of the American Public Health Association, and a Personal Health Record form. This book can be recommended highly, not only as a college text but also as interesting and helpful reading for the general public.

RICHARD A. BOLT

Committee on Nutrition in the Colonial Empire. *First Report—Part I. Nutrition in the Colonial Empire. Part II. Summary of Information Regarding Nutrition in the Colonial Empire. London: His Majesty's Stationery Office,* 1939. 210 pp. and 145 pp. Price, $.90 and $.75, respectively.

The committee points out the difficulties encountered owing to the fact that there are 48 different territories with a total population of more than 55 million divided into countless groups with different food habits and customs. For the same reason it is difficult to summarize such a report. The outstanding features are: (1) that the problem of proper nutrition is of great importance to the British Empire, involving as it does, general administration, particularly in regard to agriculture, public health work, and the maintenance of virile populations; (2) that throughout the greater part of the Colonial Empire there is a low standard of living in which ignorance is an important factor; (3) that malnutrition is one of the chief causes of the excessive infant mortality in most Colonial territories; (4) that the single most striking feature is the almost complete absence of milk and animal products from most tropical diets.

Like most English reports, this is well done. The section on the principles of correct nutrition is a textbook in itself. Of great interest are the 6 appendices. Among these, that on rice attracts attention, since it constitutes the staple food of nearly one-half the world's population. Rice, as eaten usually, is not a complete diet and leads to various nutritional deficiencies, the best known of which is beriberi. Several processes have been devised which to some extent prevent this, among which are the "josh" method of India and "parboiling." In the latter the rice is soaked sometimes as long as 4 days, and then steamed for from 10–20 minutes. During soaking and steaming vitamin B_1 diffuses into the endosperm, and in the subsequent milling some of this is retained, though a considerable amount is lost in the water. Beriberi has been seen in communities existing on parboiled rice, but it is a step in the right direction, and shorter soaking apparently avoids the excessive loss of B_1.

In Part II the many areas are considered one by one, with population, birth and death rates, infant mortality, diets, prevalent deficiency diseases, etc.

This is a valuable and interesting report.

MAZŸCK P. RAVENEL

Epidemic Encephalitis: Etiology, Epidemiology, Treatment. *Third Report by the Matheson Commission. New York: Columbia University Press,* 1939. 493 pp. Price, $3.00.

This is not a mere review of published material on the ever broadening subject of epidemic encephalitis, but rather a comprehensive treatment of a sequence of discoveries in the field and in the laboratory, tied in with an impartial evaluation of clinical applications of such discoveries. The Matheson Commission has spared no effort in linking the available evidence and making it a readable and exhaustive work on this important subject.

The list of references (number 3,532) is complete from 1930 through the first half of 1937 and includes the more important articles for the first half of 1938. With the two previous reports of the Matheson Commission, 1929 and

1932, respectively, the subject of epidemic encephalitis has been brought up to date as completely as was possible. The reader may be spared hours by consulting this report with its valuable list of references, instead of hunting through library catalogues, stacks, references lists, and indexes.

The text is well supplemented with charts, tables, and graphs. The bibliography, arranged in alphabetical order by name of author, occupies 314 pages.

Any person interested in epidemic encephalitis should make frequent use of this compact volume; those concerned with didactic instruction on the subject of encephalitis will find it equally valuable when discussing either etiology, epidemiology, or treatment.

LEONID S. SNEGIREFF

The Endocrine Glands—*By Max A. Goldzieher, M.D. New York: Appleton-Century,* 1939. 916 pp. Price, $10.00.

The first part of this text of 916 pages of fine print is given over to a consideration of the subject in general, with a brief, yet sufficiently complete discussion of the anatomic and constitutional factors, allied with the underlying principles of endocrine functions.

The remainder of the book is divided into parts dealing with individual gland structures. Each part includes a brief chapter on detailed discussion of the clinical entities. Clinical reports are included, but are well summarized and not too numerous. Illustrations of tissue sections and of the various clinical syndromes are quite good.

The chapter on the Adrenals is deserving of particular mention, for here the author crystallizes his clinical-pathological observations that have extended over many years. Tissue illustrations in this chapter are outstanding.

It is almost impossible for a reviewer to avoid taking exception to some of the clinical interpretations and therapeutic recommendations in a book on endocrinology. The diagnostic criteria set forth by the author for the diagnosis of various pituitary disorders will hardly have universal approval. Furthermore, the author's enthusiasm for oral therapy in pituitary dysfunctions is a point that may be challenged. Apparently this criticism has been met before, and the author makes no apology for his attitude, for in the preface, he writes that he "does not share the nihilistic attitude concerning therapy which seems to rule today . . ."

Such criticisms are minor and are far overshadowed by the information contained in this book. It is a definite contribution to clinical medicine, and serves as a good practical text on the subject.

The make-up and printing of the book are good, and some of the illustrations especially so.

DANIEL L. SEXTON

History of the London County Council, 1889–1939—*By Sir Gwilym Gibbon and Reginald W. Bell. London: Macmillan,* 1939. 696 pp. Price, $7.00.

Here is a storehouse of information for the student of history, public health, and social science wherever he may reside. Beginning with a lively description of London Government before 1889 (including much on sanitation and medical care) and of the reform movement, consideration is then given to the introduction of the party system and policies, to organization, procedure, finance, staff, and supplies. A detailed analysis of the Council's services embraces education, public health, medical, hospital and mental health services, housing, public health assistance, flood prevention, street improvements, public buildings, public safety, and parks. Regulative services are discussed in terms of control of land development and building, public control and administration of justice. The

concluding section deals with the Council's external relations, including those with Parliament, with other local authorities, with the public utility undertakings, and with the public. Data are given in the appendices on population, county electorate, party representation, and expenditures.

Reviewing only some of the public health features, although the entire book should be read to obtain a background of the philosophy and relationships, we find recorded in some detail the Public Health (London) Act of 1891 which was the "foundation from which sprang an organization which was to run side by side with, and indeed finally to absorb, the poor law medical service, becoming ultimately perhaps the largest health service in the world." The twelve main functions of a sanitary authority of the Act included: (1) detection and abatement of nuisances, (2) maintenance of local drainage system, (3) removal of refuse, (4) and (5) insurance of water-closets and water supply, (6–8) inspection of food, control of dairies, and offensive trades, (9–10) notification and control of infectious and epidemic diseases, (11) provision of hospitals and ambulances, (12) control of tents and vans when used as places of habitation, and to regulate use of underground rooms. These provisions are based on the code of which the provinces had been enjoying the benefit for the past 16 years, the Public Health Act, 1875. From a small nucleus in 1891 of a medical officer of health and one medical assistant, 6 inspectors, a statistical clerk, and 6 other clerks, the present department, including institutional employees, numbers over 23,000.

In these days, when the preference for carrying out public work by the direct operation of official bodies is so marked, it is worth while pausing to observe the maternity and child welfare service as an example of how an important and influential organism can come into being by voluntary effort alone, when encouraged, aided, and supervised by enlightened public authorities.

Following the success of voluntary maternity and child welfare centers, in combination with day nurseries, government recognition was given with direct grants at first by the Board of Education and later by the Local Government Board. It was made a condition of grant that their work should be coördinated with the health visiting and clinical services of local authorities. In 1929 the direct grants from the exchequer to the voluntary centers were discontinued, and in London a scheme was devised under which the Council is required to pay some 30,000 pounds a year in grants to maternity hospitals, mother or baby homes, and domiciliary midwifery; and the borough councils to pay grants for infant welfare centers, day nurseries, and homes for sick babies.

Progress in food and milk control, school medical service, control of tuberculosis, of venereal diseases, and care of the blind in addition to hospital and medical care is discussed. For the future develpoment of general hospitals the Council embarked on a planning and development survey, a term which it interpreted as covering "all questions relating to the design, erection, enlargement, alteration, structural equipment, and general maintenance of hospitals and other property under the management of the Central Public Health Committee." It is stated that hospitals for the chronically sick have been so well developed that the mixture of sick with healthy in institutions is practically a thing of the past, and that since April, 1938, all the Council's hospitals—acute, chronic, and special—have been administered under its public health powers. Experience in postgraduate medical education is also related, together with the developments in domiciliary medical service. Space does not permit of a deserved

review of the story of stupendous achievements in housing, of developments in the study and care of mental disease, and in welfare. These chapters must be read to be appreciated.

The authors have described in an interesting and enlightening manner the organization, relationships, services, and significant achievements of this great organization which has exercised such an important influence on the lives of the people of London, and stimulated the development of constructive governmental activities elsewhere. The book is well printed and effectively illustrated. The text is enlivened by topical cartoons from *Punch*. There is a useful index. IRA V. HISCOCK

BOOKS RECEIVED

SCHOOL HEALTH PROBLEMS. By Laurence B. Chenoweth, Theodore K. Selkirk, with a chapter on School Health Administration by Richard Arthur Bolt. 2d ed. New York: F. S. Crofts, 1940. 419 pp. Price, $3.00.

WAYS TO COMMUNITY HEALTH EDUCATION. By Ira V. Hiscock. New York: Commonwealth, 1939. 306 pp. Price, $3.00.

MANUAL OF PUBLIC HEALTH NURSING. Prepared by National Organization of Public Health Nursing. New York: Macmillan, 1939. 529 pp. Price, $2.50.

MINERAL METABOLISM. By Alfred T. Shohl. New York: Reinhold, 1939. 384 pp. Price, $5.00.

INDUSTRIAL HYGIENE. Edited by A. J. Lanza and Jacob A. Goldberg. New York: Oxford, 1939. 743 pp. Price, $8.50.

PUBLIC HEALTH DENTISTRY AND HEALTH SECURITY. A TEXT-WORKBOOK FOR STUDENTS AND PRACTITIONERS. By Alfred J. Asgis. New York: Clinical Press, 1939. Price, $3.50.

A TEXT-BOOK OF GYNAECOLOGY FOR STUDENTS AND PRACTITIONERS. By James Young. 5th ed. New York: Macmillan. 425 pp. Price, $5.00.

PRINCIPLES OF PSYCHIATRIC NURSING. By Madelene Elliott Ingram. Philadelphia: Saunders, 1939. 428 pp. Price, $2.75.

MEDICAL CARE (A SYMPOSIUM). LAW AND CONTEMPORARY PROBLEMS. Vol. VI, No. 4, Autumn, 1939. Duke University Law School, Durham, N. C. 186 pp. Price, $.75.

VITAMIN D. CHEMISTRY, PHYSIOLOGY, PHARMACOLOGY, PATHOLOGY, EXPERIMENTAL AND CLINICAL INVESTIGATIONS. By C. I. Reed, H. C. Struck and I. E. Steck. Chicago: University of Chicago Press, 1939. 389 pp. Price, $4.50.

UNTO THE FOURTH GENERATION. GONORRHEA AND SYPHILIS—WHAT THE LAYMAN SHOULD KNOW. By Irving Simons. New York: Dutton. 1940. 243 pp. Price, $2.50.

ANNUAL REPORT OF THE PUBLIC HEALTH COMMISSIONER WITH THE GOVERNMENT OF INDIA FOR 1937. Volume I. With Appendices. New York: British Library of Information, 1939. 345 pp. Price, $1.75.

ACCEPTED FOODS AND THEIR NUTRITIONAL SIGNIFICANCE. By Council on Foods of the American Medical Association. Chicago: American Medical Association, 1939. 492 pp. Price, $2.00.

MEDICOLEGAL AND INDUSTRIAL TOXICOLOGY—CRIMINAL INVESTIGATION—OCCUPATIONAL DISEASES. By Henry J. Eilmann. Philadelphia: Blakiston, 1940. 324 pp. Price, $3.00.

TÜRK HIFZISSIHHA VE TECRÜBÎ BIYOLOJI MECMUASI (TÜRKISCHE ZEITSCHRIFT FÜR HYGIENE UND EXPERIMENTELLE BIOLOGIE). In Turkish and German. Istanbul, Turkey. Vol. 1, No. 1, October, 1938. Vol. 1, No. 2, April, 1939.

A SURVEY OF HOSPITAL SERVICES AND FINANCES IN THE PHILADELPHIA AREA. Philadelphia: The Community Fund of Philadelphia and Vicinity, 1939. 96 pp. Price, $1.00.

CITRUS FRUITS AND HEALTH. Lakeland, Fla.: Florida Citrus Commission (Scientific Advisory Board), 1940. 73 pp.

A SURVEY OF MOUTH HYGIENE PROGRAMS FOR SCHOOL CHILDREN—5 vols.
Section I: "Thirteen Largest Cities in the United States (38)"
Section II: "Cities of 150,000 to 500,000 Population (42)"
Section III: "Cities of 100,000 to 150,000 Population (42)"
Section IV: "Cities of 50,000 to 100,000 Population (97)"
Section V: "Cities of 25,000 to 50,000 Population (179)"
Cleveland: Cleveland Child Health Association, 1939. Price, $.75 per Section.

A SELECTED PUBLIC HEALTH BIBLIOGRAPHY WITH ANNOTATIONS

RAYMOND S. PATTERSON, PH.D.

Is It Fashionable Figures or Healthier Bodies? — Statistical evidence is offered to the effect that our womenfolk don't weigh as much as they used to. Health education, Hollywood fashions, changes in the American dietary, demands of work, recreational trends, all may have played a part in the change, so you are free to hold to your pet notions about the cause.

ANON. American Women Getting Thinner. Stat. Bull. (Metropolitan Life Insurance Company) 20, 11:1 (Nov.), 1939.

Health and Industry — Eleven papers on industrial hygiene — from as many different angles—will be of interest to health officials whose work has any bearing upon this field. It is neither possible, nor necessary, to try to give a resumé of all that will be found in this useful collection.

BAUDOUIN, J. A. Industrial Hygiene from the Public Health Aspect (and ten related papers). Canad. Pub. Health J. 30, 11:517 (Nov.), 1939.

Good Maternal Hygiene—A practising physician and a state department nursing consultant give first hand accounts of a rural county maternal health program which has all the earmarks of success.

BOICE, C. A. Providing Continuity of Maternal Care, (and) HARTZ, A. E. Home Delivery Service in an Iowa County. Pub. Health Nurs. 31, 12:689 (Dec.), 1939.

First Comes Food—Do you wish a more stable society, less economic loss through needless sickness and deaths, a reduced cost of poor relief, a better chance for underprivileged children, a real equality of opportunity? Then see that every man, woman, and child gets an adequate diet. That is the rock bottom base for all social betterment.

BOUDREAU, F. G. International and National Aspects of the Campaign for Better Nutrition. J. Am. Dietet. A. 15, 10:885 (Dec.), 1939.

"Three R's" and an "H"—Health education is more than establishing health habits like love of the toothbrush and hatred for gin. Health education means understanding the human body. What the health educator should know is hinted at in this appallingly long list of basic sciences. An invigorating paper.

CARLSON, A. J. The Rôle of the Fundamental Sciences in Medical Progress. Sci. Month. 50, 1:59 (Jan.), 1940.

Here's an Idea to Speculate Upon—It has been observed that dental caries is reduced in incidence in those communities in which the drinking water contains enough fluorides to cause mottled tooth enamel. This paper discusses the possibility of adding fluorides to water supplies in quantities sufficient to influence caries but not enough to cause mottling!

COX, G. J. New Knowledge of Fluorine in Relation to Dental Caries. J. Am. Water Works Assn. 31, 11:1926 (Nov.), 1939.

After Sixty Years—Only when a health department has isolated all known open cases, when all active but

not open cases are under medical care, when a high proportion of household contacts undergo x-ray examination, and when a system of financial subsidy for needy cases is established—only then should collateral tuberculosis prevention activities be attempted, concludes this provocative paper. We seem at last to have reached the brass tacks stage of tuberculosis control. This is one of five papers constituting a symposium on Mass Tuberculin Testing and X-raying, all well worth study.

DOULL, J. A. The Tuberculin Test in the Control of Tuberculosis. Am. Rev. Tuberc. 4, 6:634 (Dec.), 1939.

A State Advances against Cancer—What New York State proposes to do for the control of cancer under its new law. Reporting, tumor-finding clinics, cancer institutes and continued research are the means to be utilized.

GODFREY, E. S., JR. New York State Program for Cancer Control. New York State J. Med. 39, 24:2280 (Dec. 15), 1939.

About Diphtheria—We thought—or hoped—that we had annotated our last paper on diphtheria prophylaxis, but here is a good one for the record. When to immunize first, when to Schick test, how many doses of toxoid to give, all are ably commented upon.

HILLMAN, M. M., and LINDE, J. I. Some Problems of Diphtheria Immunizations. J. Pediat. 15, 4:513 (Oct.), 1939.

When Tuberculin Tests May Be Hazardous—Cases are reported in which recent and unstabilized tuberculous lesions reacted unfavorably after the injection of tuberculin in the Mantoux test. This raises the question whether the injection of more than 0.01 mg. is wise, also whether it is safe to repeat positive tests. With known contacts roentgenography should precede skin tests.

LINCOLN, E. M., and GRETHMANN, W. The Potential Dangers of Tuberculin Tests. J. Pediat. 15, 5:682 (Nov.), 1939.

S.P.C.S.—Health workers will be interested in the suggestion that a new bismuth product called Sobisminol appears to be as effective in the treatment of syphilis when given by mouth as are other bismuth salts when given by injection. If these findings are confirmed by extended experience, syphilis sufferers are going to be spared a great many jabs in the buttocks.

MEININGER, W. M., and BARNETT, C. W. The Treatment of Syphilis with Sobisminol Mass Given by Mouth, (and) SCHOLTZ, J. R., *et al.* Sobisminol Mass: Clinical Results with Oral Administration. J.A.M.A. 113, 25:2214 (Dec. 16), 1939.

Cancer Mortality by Regions—Here are presented geographic variations in the occurrence of cancer of the various organs. With age adjustments, New York and Rhode Island have rates twice as high as Arkansas and New Mexico. Differences in the incidences of the various types of lesions suggest that contributory factors may be found in the environment.

MOUNTIN, J. W., and DORN, H. F. Some Peculiarities in the Geography of Cancer. J.A.M.A. 113, 27:2405 (Dec. 30), 1939.

Health Unit Services—What personal services may a county health unit staff be expected to render to the run-of-the-mine residents of the county? Three typical departments were studied. About a quarter of the entire population was reached in one year. School children got most services, then infants, then preschool children, with adults making a very poor last. What kinds of services were given is also discussed.

MOUNTIN, J. W., and FLOOK, E. The Scope of Personal Service Given by Representative County Health Departments. Health Officer. 4, 7:243 (Nov.), 1939.

Needless Suffering, Unnecessary Deaths, Enormous Economic Loss—Tuberculosis is more and more a disease of older people. The average age of discovered cases and recorded

deaths rises from decade to decade. Tuberculosis almost always occurs in families with an income less than $2,500 per year, yet each case costs more than $5,000 for care. In one state it cost $1,737 to find a case in a child under 15, but only $77 per case in those over 45. In the light of these, and related facts, what should be done? The intelligent application of a practical case-finding program in New York State is described.

PLUNKETT, R. E. Tuberculosis Control. J.A.M.A. 113, 26:2288 (Dec. 23), 1939.

For Better Maternal Hygiene—In its report upon the causes of maternal deaths during 1938 in Massachusetts, this Survey Committee continues in its good work. The record was better than the previous year. The Boston Lying-In Hospital's rate of 1.1 suggests that the state rate of maternal deaths, 3.7, might be further improved. The discussion of the underlying responsibility for unnecessary deaths continues with salutary candor. Long may this effort continue, and may it be widely copied!

TITUS, R. S. Maternal Mortality Study in Massachusetts for 1938. New Eng. J. Med. 221, 22:845 (Nov. 30), 1939.

TB. Infections and Patients—Here is additional evidence of the hazard of tuberculosis infection to nurses and interns in hospitals, particularly those with wards for tuberculous patients. It constitutes an important public health problem.

STEWART, C. A., *et al.* Primary Tuberculosis Infection Attack Rates. J.A.M.A. 113, 25:2204 (Dec. 16), 1939.

ASSOCIATION NEWS

MEETING OF THE EXECUTIVE BOARD

AT its meeting on December 18 in New York City, the Executive Board of the American Public Health Association, under the Chairmanship of Abel Wolman, Dr.Eng., Baltimore, considered important matters of Association policy and other affairs within its responsibilities as the directing agency of the Association between meetings of the Governing Council.

The Executive Board expressed to Dr. John A. Ferrell sincere appreciation for the leadership as Chairman of the Executive Board which he has provided during the last four years.

The Board ratified October 8–11, 1940, as announced for the dates of the 69th Annual Meeting in Detroit, Mich., and, at the suggestion of Dr. Henry F. Vaughan, designated Mr. Abner Larned of Detroit as the Chairman of the Local Committee.

Kenneth F. Maxcy, M.D., Professor of Epidemiology at Johns Hopkins School of Hygiene and Public Health, Baltimore, was unanimously appointed Chairman of the Association Standing Committee on Research and Standards, for the term expiring in 1942. This committee, which consists of 15 Fellows representative of the various Sections of the Association, is responsible for carrying out research and the development of standards in the technical branches of public health service, the coördination of this research, and for standardization. The committee reviews from time to time the standards already established, and recommends standards to the Governing Council for final approval.

The Board had previously noted the resignation of W. S. Leathers, M.D., who for several years has been Chairman of the Committee on Professional Education, and who is now a member of the Executive Board in his capacity as President-elect of the Association. William P. Shepard, M.D., of San Francisco was unanimously appointed to succeed to the Chairmanship of the Committee on Professional Education. This committee consists of 10 Fellows and is responsible for carrying out research and the development of standards for professional education and training in public health work. In the case of both of these committees the filling of vacancies in personnel was deferred until nominations could be received from the new Chairmen.

Huntington Williams, M.D., of Baltimore, was appointed Chairman of the Association Nominating Committee for one year.

The Committee for the award of the Sedgwick Memorial Medal consists of the last five living recipients of the award. Thomas Parran, M.D., was appointed Chairman for one year.

The following committees were reappointed for the coming year:

- The Committee on Constitution and By-laws
- The Committee on American Museum of Hygiene
- The Committee to Confer with the Interdepartmental Committee to Coördinate Health and Welfare Activities
- The Editorial Board of the Associa-

tion was reappointed and M. P. Ravenel, M.D., was reappointed Editor for the coming year. The Secretary was authorized to appoint a committee of five to serve with the ten Section Secretaries as a Program Committee. A list of about 50 Section Committees was confirmed on nomination of the Sections, and these will be printed in the *Year Book*.

Among the Association representatives appointed were: Charles F. Wilinsky, M.D., liaison officer between the American Public Health Association and the American Hospital Association; Louis I. Dublin, Ph.D., representative to the American Statistical Association Centenary Celebration, May 14; Louis I. Dublin, Ph.D., John A. Ferrell, M.D., and Reginald M. Atwater, M.D., to the National Health Council; Ira V. Hiscock, Sc.D., to the National Conference for Coöperation in School Health Education; Abel Wolman, Dr.Eng., and C. E. Turner, Dr.P.H., to the American Association for the Advancement of Science; Haven Emerson, M.D., to a conference on Nomenclature to be held by the American Medical Association.

The Association became a service member of the Social Work Publicity Council which maintains a portfolio collection of more than 100 volumes of representative publicity material as exhibited at the A.P.H.A. Annual Meetings. The Council is a national clearing house of information and ideas to assist public health and social welfare workers in their efforts to win community understanding and support.

The Executive Board endorsed two resolutions from the Engineering Section—one relating to the place of engineering in public health, and the other requesting the appointment of a subcommittee of the Committee on Research and Standards on the cleansing of dishes. This latter was referred to the chairman of the committee for appropriate action. A further resolution from the Engineering Section relating to proportionate representation of the Section among Elective Councilors was referred to the Committee on Constitution and By-laws for further study.

In addition to many other important considerations undertaken by the Board, the budget for 1940 came up for adoption. The Board was informed of a small prospective balance of income over expenditures for 1939 which, together with additions from recent years, would make the addition to surplus in the last 5 years about $15,000, comparing with about the same amount which has been accumulated in the preceding 63 years of Association history. Particularly gratifying was the fact that membership income for the past year for the first time in the history of the Association had passed $40,000. The budget as finally approved showed anticipated income of $161,550, and anticipated expense of $161,460. Among special grants for purposes of the Association and its committees there were announced grants from the Commonwealth Fund for a continuation of the State Health Studies; from the W. K. Kellogg Foundation for continuation of the Rural Health Conservation Contest and for the work of the Sub-committee on Evaluation of Administrative Practices; a grant from the Milbank Memorial Fund toward the Committee on the Hygiene of Housing; and from the Charles H. Hood Educational Trust toward the work of the Committee on Community Organization for Health Education.

APPLICANTS FOR MEMBERSHIP

The following individuals have applied for membership in the Association. They have requested affiliation with the sections indicated.

Health Officers

Fletcher R. Adams, M.D., Catawba County Health Dept., Newton, N. C., Health Officer

Joseph S. Baird, M.D., Municipal Hospital, Pittsburgh, Pa., Superintendent

William F. Bell, M.D., Shamrock Hotel, Gainesboro, Tenn., Assistant Director, Upper Cumberland District Health Dept.

Herbert E. Cannon, M.D., Box 239, Covington, La., Director, St. Tammany Parish Health Unit

William H. Conger, M.D., 110 Academy St., Poughkeepsie, N. Y., Health Officer

Rosier D. Dedwylder, M.D., Cleveland, Miss., Director, Bolivar County Health Dept.

Dr. Juan De Moya, Secretary of Public Health and Charities, Havana, Cuba

Charles E. Finlay, M.D., 710 Wilson, Havana, Cuba, Director of Public Health

Robert A. Herring, M.D., 118 N. Main St., High Point, N. C., Director of Health

Anthony J. Manzella, M.D., 64 Grand St., Newburgh, N. Y., Health Officer

Claudio E. McNenney, M.D., Room 16, City Hall, Jersey City, N. J., Chief, Medical Division, City Board of Health

George F. Moench, M.D., 136 N. Franklin St., Delaware, Ohio, County-City Health Commissioner

Kirk T. Mosley, M.D., 286 Chestnut Hill Ave., Brighton, Mass., Medical Director, Miller County Health Unit (Arkansas)

Arthur B. Price, M.D., M.P.H., 3923 Oakwood Rd., Little Rock, Ark., Consultant, Venereal Disease Control, State Dept. of Health

Roy G. Reed, M.D., P. O. Box 1181, Kermit, Tex., Director, Winkler County Health Unit

Joseph Roby, M.D., 234 Culver Rd., Rochester, N. Y., Deputy Health Officer and Consulting Epidemiologist, State Dept. of Health

Jerome J. Sievers, M.D., M.S.P.H., 36½ S. Locust St., Pana, Ill., District Health Superintendent, State Dept. of Public Health

James J. Siragusa, M.D., 261 Hanover St., Boston, Mass., Medical Inspector in charge of East Boston Health Unit

Richard H. Wilcox, M.D., C.P.H., Pendleton, Ore., Umatilla County Health Officer

Henry C. Wilkinson, M.D., Health Dept., Hamilton, Bermuda, Senior Medical Officer

Laboratory

Branch J. Aymond, M.D., 316 Civil Court Bldg., New Orleans, La., Director, Educational and Research Division, Bureau of Parish Health Administration

Pierre A. Berard. D.Sc., Laboratories, Health Department, Montreal, Que., Canada, Chemist

Albert Dickman, Ph.D., 1419 W. Erie Ave., Philadelphia, Pa., Director, Dickman Laboratories

O. N. Eisaman, M.D., 652 City-County Bldg., Pittsburgh, Pa., Director, Bacteriological Laboratory, Dept. of Health

Dean H. Fisher, A.B., C.P.H., District Health Center, Rockland, Me., District Sanitarian

Paul Fugazzotto, A.B., M.S.P.H., 65 Diamond Ave., N.E., Grand Rapids, Mich., Bacteriologist, Western Michigan Division, Michigan State Laboratories

Ralph M. Leonard, M.A., 10 Stewart. Athens, Ohio, Sanitarian, Health Dept.

Roger D. Minster, M.Sc., 1615 8th St., So., Nampa, Ida., Operating Minster Biological Laboratories

Elizabeth Petran, Ph.D., 2411 North Charles St., Baltimore, Md., Senior Bacteriologist, State Dept. of Health

Frank C. Rainier, 5123 Ridgedale Ave., Dallas, Tex., Assistant City Bacteriologist, Dept. of Public Health

William G. Rothe, Ph.G., Lake St., Box 133, Bloomingdale, Ill., Owner, Rothe Laboratory and Pharmacy

Vital Statistics

Ethelyn Gartman, A.B., 224 Cloverdale Rd., Montgomery, Ala., Junior Statistician, Bureau of Vital Statistics, State Health Dept.

Ralph B. Lopez, O.D., Brown Bldg., Waterbury, Conn., Director of Public Health in Optometry, Connecticut Optometric Society

Lawrence A. Wilson, 900 S. 5th Street, Springfield, Ill., Statistician, State Dept. of Health

Engineering

Graves J. Grant, Jena, La., Inspector, Bureau of Parish Health Administration

Harold M. Olson, 171 Longue Vue Dr., Mt. Lebanon, Pa., Promotional Water Softening Engineer, Ohio Salt Company

Wiley V. Parker, 327 Federal Bldg., Memphis,

Tenn., Assistant in Sanitary Engineering, U. S. Public Health Service

Robert G. Scott, B.S., 1847–111 West Washington, Chicago, Ill., Consulting Engineer, Clay Products Assn.

George J. Toman, B.S., State Department of Health, Bismarck, N. D., Associate Sanitary Engineer

Industrial Hygiene

Leon H. Warren, M.D., 319 Fairfield Dr., Bethesda, Md., Assistant, Office of Dermatoses Investigations, U. S. Public Health Service

Food and Nutrition

Alfonse E. Budzilek, B.S., 431 Park St., Bridgeport, Conn., Milk Inspector, Health Dept.

Harry F. Lewis, The Institute of Paper Chemistry, Appleton, Wis., Research Worker

Maternal and Child Health

Leah Gold, D.H., 102 York Square, New Haven, Conn., Dental Hygienist and Dental Health Educator, Health Dept.

Carl Greenwald. D.D.S., M.S.D., 54 W. Hubbard St., Chicago, Ill., Chief, Division of Dental Hygiene, Dept. of Health

Marion Hotopp, Harvard School of Public Health, 55 Shattuck St., Boston, Mass., Student

William M. Little, M.D., 55 W. Cherry St., Woodmont, Conn., State Director of Child and Maternal Welfare (Nevada)

Marion I. Scott, D.D.S., 902 Euclid Ave., Berkeley, Calif., Assistant Chief, Dental Services, Bureau of Child Hygiene, State Dept., of Health

Gustav Tugendreich, M.D., 717 Old Lancaster Rd., Bryn Mawr, Pa., Research Associate, Bryn Mawr College

Public Health Education

Edgar N. Brown, B.A., B.Com., 1675 West 10th Ave., Vancouver, B. C., Canada, Executive Director, Greater Vancouver Health League.

Harold T. Brown, M.D., 2851 Bedford Ave., Pittsburgh, Pa., Physician-in-charge of Out-Patient Dept. and Roentgenologist, Tuberculosis League of Pittsburgh

Rafael Calvo y Fonseca, M.D., San Rafael 1170, Havana, Cuba, Chief of Inspectors, Technical Service of Rural Public Health

Harry Herman, R.N., M.A., 238 East 95 St., Brooklyn, N. Y., Volunteer Worker in Health Education, Kips Bay-Yorkville District Health Center

Bertha I. Hughes, B.S., 141 Whittier Ave., Providence, R. I., Health Educator, H. P. Hood Co.

Frieda L. Kruse, M.D., 212 Edgewood Ave., San Francisco, Calif., Pediatrician, Board of Health

Charlotte V. Leach, B.S., 1208 East University, Ann Arbor, Mich., Student, University of Michigan

Dr. Federico G. Rosi, I. 562, Vedado, Havana, Cuba, President, Dept. of Press and Publicity, Technical Service of Rural Public Health

Frank J. Smith, Ph.G., Loudonville Rd., M. C. # 3, Albany, N. Y., Supervisor, Bureau of Narcotic Control, State Dept. of Health

Lucille A. Sullivan, A.B., 3723 Olive St., St. Louis, Mo., Program Director, St. Louis Chapter, American Red Cross

Joseph H. Weisberg, M.D., 1302 Tower Ave., Superior, Wis., School Physician

Public Health Nursing

Amos P. Dublin, A.B., 440 West 34 St., New York, N. Y., Correspondent, Metropolitan Life Insurance Co.

Gertrude M. Page, R.N., Kalkaska, Mich., Kalkaska County Nurse

Ella L. Pensinger, R.N., B.S., 40 Benedict Ave., Tarrytown, N. Y., Assistant Director, National Organization for Public Health Nursing

Evelyn H. Schoen, B.S.. Mary Kirkland Hall, Vanderbilt University, Nashville, Tenn., Assistant Professor of Obstetric Nursing

Josephine C. Secor, R.N., 15 Division St., Amsterdam, N. Y., District Supervising Nurse, State Dept. of Health

Gladys G. Towson, R.N., Public Schools, Darien, Conn., Health Counselor

Epidemiology

Dr. Gaspar Agramonte, 258 Consulado St., Havana, Cuba, Captain, Medical Corp, Cuban Navy

Sombun Phong Aksara, M.B., 55 Shattuck St., Boston, Mass., Student, Harvard School of Public Health

Juan D. Castro, M.D., Reina 360, Havana, Cuba, Epidemiologist, National Health Dept.

Joseph M. Dowis, M.D., 2013 Commerce, Dallas, Tex., Epidemiologist, Health Dept.

Solomon Pearlman, M.D., Dept. of Public Health, 300½ S. 2 St., Springfield, Ill., Assistant Epidemiologist

Digavally Subbarao, M.B., 55 Shattuck St., Boston. Mass., Student, Harvard School of Public Health

Louis C. Tauscher, 31 Glorieux St., Irvington, N. J., Food and Drug Inspector, Dept. of Health

Ronald E. Vioni, M.D., 842 North Ave., Bridgeport, Conn., Director of Communicable Diseases, Dept. of Health

Unaffiliated

Charles F. Deatherage, D.D.S., Apt. 315, 14 Buswell St., Boston, Mass., Student, Harvard School of Public Health

Sherman S. Pinto, M.D., 131 Washington St., Brighton, Mass., Student, Harvard School of Public Health

Belle D. Sharefkin, B.A., 3101 Ave. I, Brooklyn, N. Y.

A GOOD way to attack the 1939–1940 *Year Book* is to begin with the Report of the Executive Board to the Governing Council. It paints a broad picture of general Association activities, and calls attention to some of the especially significant undertakings of the standing, Association, and Section Committees. The Executive Board's account of its stewardship is an information summary of an eventful year in Association affairs.

EMPLOYMENT SERVICE

The Employment Service will register persons qualified in the public health field without charge.
Replies to these advertisements, when keyed, should be addressed to the American Public Health Association, 50 West 50th Street, New York, N. Y., identifying clearly the key number on the envelope.

POSITIONS AVAILABLE

Young, energetic, well trained public health nurses needed in Montana for rural areas. Salary $135 per month, plus travel. Write Supervisor of Public Health Nursing, Montana State Board of Health, Helena, Montana.

POSITIONS WANTED

Well qualified physician, with M.P.H. from Johns Hopkins, experienced as county health officer and now assistant health officer in a large city, will consider county or city administrative position. A383

Physician, M.D., University of Cincinnati; with postgraduate training in venereal disease control, Johns Hopkins, is available as venereal disease control officer. A363

Well qualified physician, M.D., Rush; M.S.P.H., University of Michigan; with 3 years' residence in tuberculosis, and special interest in venereal disease control, seeks responsible appointment. Excellent references. A406

Physician, M.D., class A medical school; M.S.P.H., University of Michigan, 1937; experienced district state health officer, seeks city or city-county administrative position. A367

MISCELLANEOUS

Dentist, with 2 years' experience in administrative position, now taking postgraduate work in oral health, wishes position as director of oral health in a state or local health department. M446

Physician, aged 37; B.S., M.D., Ohio State; 4 years with large city health department; public health training at University of Michigan; experienced in communicable disease investigation and well baby clinic work, seeks public health position with future. M447

NEWS FROM THE FIELD

SOCIETY OF AMERICAN BACTERIOLOGISTS

THE annual meeting of the Society of American Bacteriologists, attended by over 600 members of the Society, was held in New Haven, Conn., December 28–30, 1939. This was the 40th anniversary of the founding of the society in the same city. Several of the charter members were present and special recognition of the anniversary was made at the annual banquet and in a round table discussion on the history of bacteriology, with special reference to the Connecticut Valley.

The Eli Lilly Award of a medal and $1,000 prize was presented to Dr. John G. Kidd of the Rockefeller Institute by Dr. A. T. Henrici, President of the Society. The award, presented to a young man or woman under 31 years of age for outstanding contribution in bacteriology or immunology, was given Dr. Kidd for his original work on animal tumors of virus etiology.

In the scientific program, 160 papers were read on a wide variety of subjects.

Dr. Charles Thom, of the U. S. Department of Agriculture, was elected President, succeeding Dr. A. T. Henrici, of the University of Minnesota.

NEW FEDERAL NUTRITION LABORATORY TO BE ESTABLISHED IN CORNELL UNIVERSITY

IN announcing a new laboratory at Ithaca, N. Y., at which many of the researches on nutrition of the U. S. Department of Agriculture will be centered, Secretary Wallace recently stated that the new laboratory is expected to develop facts that will enable practices in soil management and crop production to be dovetailed more closely with human nutritional needs. He said that agricultural scientists have done a good job in solving problems of quantity production and market quality but that today new advances in the science of nutrition make it necessary to do an equally good job on quality production as it relates to nutritional value. He stated that one of the objectives of a research program would be to determine the exact amount of the minerals necessary for the improvement of plant and animal life. The time is regarded as ripe for beginning a system of study starting with the soil and going through to man. Those in charge of the project believe that the investigations will lead eventually to the production of foods which contain all the complex and subtly balanced nutrients which human beings need for sound health.

BIOLOGICAL ABSTRACTS

THOSE engaged in research in medicine, public health, ecology, agriculture, forestry, botany or zoölogy, geography, and other fields, will welcome the announcement that *Biological Abstracts* is undertaking a more complete abstracting and segregation of the current research literature in bioclimatology and biometeorology. The section "Bioclimatology-Biometeorology" will appear within the section "Ecology" in *Biological Abstracts*, and will be under the editorship of Robert G. Stone, of the Blue Hill Observatory, Harvard University.

GRANT FOR MOTHERS AND BABIES

THE National Council for Mothers and Babies, Incorporated, Washington, D. C., has announced a grant of $10,000 from the Carnegie Corporation toward the program, and a pledge of $30,000 from an anonymous donor to support the purposes of the Council. The American Public Health Association is a member agency of the National Council for Mothers and Babies.

NEW SUMMER COURSE AT MASSACHUSETTS INSTITUTE OF TECHNOLOGY

THE Massachusetts Institute of Technology has announced a graduate program in public health, school health, and health education under which the Certificate in Public Health will be offered to professional school health workers through a series of specially arranged summer sessions, beginning in the summer of 1940. This program to be completed in summer sessions will require four summers. The program is also open to suitably qualified members of the staffs of health departments and private health agencies.

Requirements for the Certificate will include at least a Bachelor's degree from a recognized institution, together with completed courses in chemistry, anatomy, physiology, bacteriology, and (except for Doctors of Medicine) education. The program, which will last 7½ weeks, will begin the first Monday in July and close in the third week in August.

Applications must be received by May 15. Further information can be obtained from Professor C. E. Turner, Massachusetts Institute of Technology, Cambridge, Mass.

A DEPARTMENT OF PREVENTIVE MEDICINE FOR JOHNS HOPKINS MEDICAL SCHOOL

IT was announced on January 9, by Dr. Isaiah Bowman, President of Johns Hopkins University, Baltimore, that a new Department of Preventive Medicine has been established in the Medical School, and that Perrin H. Long, M.D., has been appointed head of the department. Dr. Long, who was graduated from the University of Michigan in 1924, has been connected with the Medical School for some years and has done research with sulfanilamide and kindred drugs. President Bowman announced that the department was financed under a grant from the Rockefeller Foundation of $350,000 for the next 10 years.

AMERICAN STANDARDS ASSOCIATION

AT the recent annual meeting of the American Standards Association, Edmund A. Prentis, President, reported on the completion of the Association's 21st year as a central coördinating agency for the development of American industrial standards. During this time more than 400 standards have been approved and about 600 industrial and governmental groups have taken part in the work.

The American Standards Association announces that work undertaken during the past year includes a program of standards for the prevention of occupational disease, including silicosis and other conditions related to poisonous dusts and gases.

COLORADO PUBLIC HEALTH ASSOCIATION

THE second annual meeting of the Colorado Public Health Association was held October 3 and 4 at the Antler's Hotel, Colorado Springs, Colo. The morning session of the first day was devoted to problems of sanitation. Papers on "Sewage Treatment," "Sanitary Study of Colorado Swimming Pools," "Undulant Fever," and "Program of a County Health Unit" were presented. An entire afternoon was devoted to discussion of child health. The relationship between mental hygiene and public health was discussed and the mental hygiene program of the State Division of Child Welfare was explained. Papers regarding care of children's teeth and school health were given by specialists in their respective fields. Immunization, tuberculosis, microbiology, milk, obstetrics, the health program of the State of Colorado and that of the Junior Chamber of Commerce were subjects given consideration during the 2 day session.

The entire program was stimulating and did much to provoke a keen interest in the public health problems of Colorado.

SANITARIANS TRAINING COURSE

IT is announced that a Training Course for Sanitarians, Inspectors, and Public Health Workers will be given by the Department of Municipal and Sanitary Engineering, A. & M. College, College Station, Tex. This will be conducted jointly by A. & M. College of Texas, Texas State Health Department, Bryan-Brazos County Health Unit, and Texas State Board for Vocational Education.

The subjects presented are: communicable diseases, general sanitation, water sanitation, swimming pool operation and sanitation, sewage treatment, sanitary laboratory, milk and food sanitation, insect and rodent control, public health administration, and publicity and public speaking.

There will be no tuition cost, but a fee of $10 will be charged to care for certain laboratory and field expenses. Rooms are available in a College dormitory at $5 per month per person (two in a room), and board can be obtained at the College at a cost of $22.50 per month. The total cost for the 12 weeks will be about $100. Board and room can be obtained off the Campus if desired.

Registration is scheduled for February 10, and classes start February 12 and continue for 12 weeks, ending May 4.

UNIVERSITY OF MINNESOTA FELLOWSHIPS, 1940–1941

THE University of Minnesota has announced a number of in-service fellowships in Public Administration for the academic year 1940–1941. The period of training will extend from the beginning of the fall term through the winter and spring quarters and the first term of the summer session. Individual courses of study will be planned for each student, depending upon previous preparation, personal interests, and the requirements of public service. These in-service fellowships will carry stipends varying in amount from $1,000 to $1,500 a year, depending upon the student's experience, his present salary, and the number of his dependents.

Applicants for these fellowships must be citizens of the United States, not over 35 years of age, graduates of recognized universities and colleges, and must qualify for admission to the Graduate School of the University of Minnesota. They must have had not less than three years of experience in public service, preferably in a position involving some administrative responsibility. Each applicant must be endorsed by his governmental employer, and he should secure promise of a leave of absence for the duration of his fellowship year.

Applications must be submitted not later than April 1, 1940. Requests for application blanks and further information should be addressed to the Secretary of the Committee on Training for Public Administration, 13 University Library, University of Minnesota, Minneapolis, Minn.

DENTAL CENTENARY CELEBRATION

DENTISTRY will celebrate the 100th birthday of the profession next March 18, 19, and 20, at Baltimore, Md., commemorating in appropriate fashion the development of dental education, dental journalism, and dental organization. With every phase of modern dentistry being depicted, along with historic exhibits on a hundred years of progress, public dental health will receive a full measure of emphasis.

Dr. Edward S. Godfrey, Jr., President of the American Public Health Association, has accepted an invitation to attend. Surgeon-General Thomas Parran will be a principal speaker at the Tuesday (March 19) morning session. On Tuesday afternoon at 2:00 o'clock a Section on Public Dental Health will

meet and hear three papers, the first by Dr. Abel Wolman, immediate past-President of the American Public Health Association, a second by O. W. Brandhorst, D.D.S., of St. Louis, and the last by Leon Kramer, D.D.S., of Topeka. Dr. Wolman will represent the viewpoint of a non-dentist public health worker, Dr. Brandhorst that of the dental profession, and Dr. Kramer (who is President of the American Association of Public Health Dentists) that of the public health dentist.

The meetings will be open to allied health service groups on presentation of annual membership cards. A cordial invitation to A.P.H.A. members to attend is extended. Inquiries relative to any details of the meeting may be directed to either Dr. B. Lucien Brun, General Chairman, 827 Park Avenue, Baltimore, Md., or to Dr. Richard C. Leonard, care of Maryland State Department of Health, 2411 N. Charles Street, Baltimore.

RADIO PROGRAM ON PUBLIC HEALTH

THE National Broadcasting Company announces that a radio program "On Your Job," to be presented over the Red Network of NBC on Sunday, March 24, will be entitled "Lady in Blue" and will deal with public health and nursing. The time is 12:30–1:00 P.M. EST. The program is under direction of Prof. Harry D. Kitson, of Teachers College, Columbia University, and Frank Ernest Hill, of the American Association for Adult Education.

PERSONALS

Central States

GREGOIRE F. AMYOT, M.D., D.P.H.,* for the last two years Administrative Associate of State Health Studies conducted by the Committee on Administrative Practice of the American Public Health Association, has been appointed Provincial Health Officer of British Columbia, with offices at Victoria. Dr. Amyot succeeds the late H. E. YOUNG, M.D.,* in this position. Dr. Amyot took over his duties early in January, after several months spent as a teaching associate on the staff of the University of Minnesota, Minneapolis.

DR. HARRY W. DAVIS, of Plains, Kan., was recently appointed Health Officer of Meade County.

CARLETON DEAN, M.D., C.P.H.,* for the past 9 years Health Officer of the District Health Unit at Charlevoix, has been appointed Deputy Commissioner of the Michigan State Department of Health, and Director of the Bureau of Local Health Service. He succeeds ALBERT S. MCCOWN, M.D.,† resigned.

JAMES A. DOLCE, M.D.,† of Allegan, Mich., will serve as Acting Director, while LLOYD H. GASTON, of Sandusky, Mich., Director of the Sanilac County Department of Health, is studying at Yale University, New Haven, during the coming months.

CLIFTON F. HALL, M.D., M.P.H.,† of Topeka, Kan., Director of the Division of Tuberculosis Control for the State Board of Health, will serve as Director of the Mecosta-Osceola Health Department during the absence of MAX C. IGLOE, M.D.,† of Big Rapids, Mich., who is studying at Johns Hopkins University, Baltimore, Md.

WALTER H. HARTUNG, M.D.,* of Toledo, Ohio, former State Director of Health, has been appointed Superintendent of the City Bureau of Medical Relief in Toledo.

DR. EDWIN N. HESBACHER, formerly of Minneapolis, Minn., has been placed in charge of the Polk County, Ia., Health Unit.

AMALIA E. LAUTZ, PH.D., Assistant Professor of Home Economics, Butler University, Indianapolis, Ind., has been placed in charge of the newly

organized Nutrition Division of the Michigan State Department of Health; the Division will function under the Bureau of Maternal and Child Health.

DR. OSCAR LOTZ, of Milwaukee, Wis., has been elected Executive Secretary of the Wisconsin Anti-Tuberculosis Association, to succeed the late HOYT DEARHOLT, M.D.*

MARSHALL W. MEYER, M.D.,† formerly of Almond, Wis., has been appointed Health Officer of the Ninth Sanitary District, with headquarters in Ashland.

DR. GILBERT E. SEAMAN, formerly Acting Superintendent of the Winnebago State Hospital, Winnebago, Wis., was recently made Acting Director of the Division of Mental Hygiene in the new Wisconsin State Department of Public Welfare.

Eastern States

DR. FRANCIS H. BURKE, of Rockville, Conn., has been appointed Health Officer of Tolland.

CHARLES V. CHAPIN, M.D.,* of Providence, R. I., celebrated his 84th birthday on January 17, receiving many congratulations on his extended service in public health.

DR. JULIAN G. ELY, of Old Lyme, Conn., has been named Health Officer of Salem.

MARION F. HARALSON, M.D.,† Sr. Surgeon, U. S. Public Health Service, New York, N. Y., has been appointed Commissioner of Public Health of the Territory of Hawaii, as of December 5.

HARVEY S. KINNE, M.D.,† of Albany, N. Y., Assistant District State Health Officer of the New York State Department of Health, has been appointed Commissioner of Health of the Cortland County Department of Health, Cortland, N. Y., succeeding M. R. FRENCH, M.D.,* resigned.

DR. MARK M. KROLL, of Cresskill, N. J., has been appointed full-time Medical Consultant in Social Hygiene on the staff of the New York State Department of Health

DR. GEORGE S. LAMBERT, of Danielson, Conn., has been appointed Health Officer of Brooklyn.

HERBERT B. LARNER, of Glen Ridge, N. J., Biologist and Sanitary Engineer, was elected President of the Glen Ridge Board of Health recently, to succeed MORRISON P. CHITTERLING, who was acting president since September, when RICHARD C. SMITH resigned.

DR. ARTHUR D. MARSH, of Hampton, Conn., has been appointed Health Officer of Chaplin.

DR. HUBLEY R. OWEN has been appointed Director of Public Health of Philadelphia, Pa., succeeding CHARLES F. NASSAU, M.D., Sc.D., LL.D.† Dr. Owen is Professor of Clinical Surgery at the Woman's Medical College of Pennsylvania, and prior to his new appointment, was Chief Police Surgeon of Philadelphia.

DR. FRED E. ROSS, of Erie, Pa., was recently appointed Medical Director of Erie County, succeeding DR. JAMES T. STRIMPLE.

DR. MARTHA TRACY, Dean of the Woman's Medical College of Pennsylvania, has been appointed as Assistant Director of Public Health of Philadelphia. She has been a member of the City Board of Health since 1936, and served at the Woman's Medical College of Pennsylvania as Professor, respectively, of Physiologic Chemistry, Hygiene, and Preventive Medicine from 1913 to 1931, and has been Dean since 1918.

DR. THOMAS F. VESTAL, of Worcester Mass., has been appointed Medical Director of the Division of Industrial

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* Fellow A.P.H.A.
† Member A.P.H.A.

Hygiene in the North Carolina State Board of Health, succeeding HERMAN F. EASOM, M.D.,† resigned.

DR. WILLIAM V. WENER, of Norwich, Conn., has been appointed Health Officer of Bozrah.

Southern States

C. A. ABELE, CH.E.,* of Montgomery, Ala., has severed his connection with the Alabama State Board of Health, to accept the position of Co-Director, Division of Dairy Products for the City of Chicago Board of Health.

WILLIAM H. BALL, M.D.,† of Panama City, Fla., Director of the Bay County Health Unit, has been appointed State Director of Maternal and Child Health, with headquarters in Jacksonville.

DR. IVAN E. BIGLER, of Ada, Okla., has been appointed Health Officer of Pontotoc County.

OSCAR G. COSTA-MANDRY, M.D.,* of Santurce, P. R., Director of the Biological Laboratory of the Department of Health in Puerto Rico, has been elected President of the Puerto Rico Medical Association for the year 1940.

DR. O. HIRAM COWART, of Bristow, Okla., has been appointed Health Officer of Creek County

LEONARD H. DENNY, M.D.,† has resigned as Director of the Department of Public Welfare of Portsmouth, Va., in order to return to service in the U. S. Navy.

DR. RUDOLPH H. DUEWALL, of Miami, Okla., has been appointed Health Officer of Ottawa County.

HERBERT G. DYKTOR,* formerly of the St. Louis Health Department, St. Louis, Mo., is now Chief Engineer of the Bureau of Industrial Hygiene of the Michigan Department of Health, with headquarters at the Herman Kiefer Hospital, Detroit, Mich.

DR. LEO R. EVANS, of Pryor, Okla., has been appointed Health Officer of Mayes County.

DR. WILLIAM K. EVANS, of Lake Providence, La., has been appointed Health Officer of West Carroll Parish, succeeding DR. WILLIAM J. BUFFALOE, of Oak Grove, who resigned to engage in private practice in North Carolina.

DR. DAVID W. GILLICK, Superintendent and Physician in Charge of the Shawnee Indian Sanatorium, Shawnee, Okla., has been appointed Medical Director for District No. 5 of the Indian Medical Service, succeeding the late DR. WALTER S. STEVENS. DR. RALPH M. ALLEY, of Pine Ridge, S. D., succeeds Dr. Gillick.

GEORGE M. LEIBY, M.D., DR.P.H.,† of Raleigh, N. C., for the last 3 years Director of the Division of Venereal Disease Control of the North Carolina State Department of Health, has been appointed as the first full-time Director of the Venereal Disease Service for the District of Columbia, Washington, D. C.

KATHARINE F. LENROOT,* of Washington, D. C., completed 25 years of service with the Children's Bureau on January 2. Miss Lenroot, who began her service with the Children's Bureau as special agent, is now Bureau Chief.

DR. JAMES T. MCINNIS, of Muskogee, Okla., has been appointed Health Officer of Muskogee County.

DR. EDWIN L. MCQUADE, formerly Director of Rural Health in the Virginia State Department of Health, has been appointed a member of the Bureau of Epidemiology of the Michigan State Department of Health; he will direct the program for the detection and control of typhoid carriers.

DR. JULIAN T. MILLER, retired naval officer, has been appointed as Director of the Department of Public

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* Fellow A.P.H.A.
† Member A.P.H.A.

Welfare of Portsmouth, Va., to succeed LEONARD H. DENNY, M.D.,† resigned.

DR. WILLIAM E. SEBA, of Leedey, Okla., has been appointed Health Officer of Dewey County.

DR. VIRGINIA SMALL, formerly of Nashville, Tenn., has been appointed Staff Physician of the Bureau of Maternal and Child Health of the Wisconsin State Board of Health.

DR. HOUSTON H. TERRY, formerly of Fort Worth, Tex., has been appointed Director of the Cooke County Health Unit.

WILLIAM D. TILLSON, M.D.,† Director of the Bureau of Industrial Hygiene, Virginia State Department of Health, since July, 1936, has resigned to become Medical Director of the American Viscose Company, Parkersburg, W. Va.

FRED O. TONNEY, M.D.,† of Washington, D C., and formerly with the Chicago, Ill., Health Department, has been assigned as Health Commissioner of Delta County, Mich., during the leave of absence of ROELOF LANTING, M.D.,† of Escanaba.

JAMES P. WARD, M.D.,† has been transferred to the Washington County Health Department in Greenville, Miss., succeeding DR. B. F. HAND.

DR. DEA C. WITT, of Jacksonville, Fla., of the Ocala Health Unit, has been appointed Director of the Bay County Health Unit, succeeding WILLIAM H. BALL, M.D.,† of Panama City.

Western States

JOHN A. CARSWELL, M.D., D.P.H.,† who for several years has been Epidemiologist in the Territorial Department of Health, Juneau, Alaska, has been appointed Assistant Executive Secretary of the Wisconsin Anti-Tuberculosis Association, Milwaukee, Wis., as of January 15.

DR. EDWARD J. DEHNE, formerly of Astoria, Ore., has been appointed Health Officer of Coos County, to succeed DR. LESLIE S. PORTER, of Eugene, who resigned to join the University of Oregon health service.

LUCILLE PEROZZI, R.N.,† of Portland, Ore., has been appointed Director of the Division of Public Health Nursing in the Oregon State Board of Health, succeeding OLIVE M. WHITLOCK, R.N.,* resigned.

ENOCH M. PORTER, M.D., of Great Falls, Mont., has been named Vice-President of the State Board of Health, filling the unexpired term of the late LOUIS H. FLIGMAN, M.D.,† of Helena.

LELAND E. POWERS, M.D.,† formerly of Port Angeles, Wash., has been appointed Health Officer of Tacoma.

DR. CHARLES SMITH has been appointed Health Officer of Denver, Colo., with headquarters at the Denver General Hospital. He will have charge of public health details formerly handled by DR. THEODORE I. WILLIAMS, Deputy Manager of Health and Charity, who has taken over other administrative duties. CARL P. SCHWALB is the new Manager of Health and Charity.

OLIVE M. WHITLOCK, R.N.,* for the last 4 years Director of the Division of Public Health Nursing of the Oregon State Board of Health, Portland, has joined the staff of the U. S. Public Health Service as Regional Public Health Nursing Consultant for District No. 2, the South Atlantic States. In this District, Miss Whitlock will succeed MARY J. DUNN, M.A.,* who will become Assistant to PEARL MCIVER, R.N.,* in the Service. During the next year, Miss Dunn will make a study in coöperation with the National Organization for Public Health Nursing of the curricula of

* Fellow A.P.H.A.
† Member A.P.H.A.

public health nursing courses in the United States.

Foreign

PORTER J. CRAWFORD, M.D.,* a Health Officer in Ohio during the early twenties and for the past several years with the International Health Division of the Rockefeller Foundation doing yellow fever and malaria control and investigations in Brazil and Panama, was recently appointed regional representative of the International Health Division in the Caribbean Region comprising Central America, the West Indies, and Northern South America.

* Fellow A.P.H.A.

CONFERENCES AND DATES

American Association for Health, Physical Education, and Recreation (division of the National Education Association). Hotel Stevens, Chicago, Ill. April 24–26.

American Association for Social Security. New York, N. Y. April 12–13.

American Association of Public Health Dentists. Cleveland, Ohio. September 8–9.

American Association of School Administrators. St. Louis, Mo. February 24–29.

American Association of Social Workers (Delegate Conference). Grand Rapids, Mich. May.

American Camping Association — New England Section. Statler Hotel, Boston, Mass. February 16–17.

American Dental Association. Cleveland, Ohio. September 9–13.

American Dietetics Association — 23rd Annual Meeting. New York, N. Y. October 21–24.

American Heart Association. Scientific Meeting. Hotel Roosevelt, New York, N. Y. June 7–8.

American Home Economics Association —33rd Annual Meeting. Cleveland, Ohio. June 23–27.

American Hospital Association. Boston, Mass. September 16–20.

American Library Association. Cincinnati, Ohio. May 26–June 1.

American Medical Association — 91st Annual Meeting. Waldorf-Astoria Hotel, New York, N. Y. June 10–14.

American Orthophychiatric Association —17th Annual Meeting. Hotel Statler, Boston, Mass. February 22–24.

American Physiological Society. New Orleans, La. March 13–16.

American Public Health Association —69th Annual Meeting. Book-Cadillac Hotel, Statler Hotel, Detroit, Mich. October 8–11.

American Red Cross—Annual Convention. Washington, D. C. April 1.

American Scientific Congress—8th. In connection with celebration of 50th Anniversary of founding of the Pan American Union. (First Section meeting, May 13.) Washington, D. C. May 10–18.

American Society for Experimental Pathology. New Orleans, La. March 13–16.

American Society for Pharmacology and Experimental Therapeutics. New Orleans, La. March 13–16.

American Society of Civil Engineers—Spring Meeting. Kansas City, Mo. April 17–19.

American Water Works Association—60th Annual Meeting. Kansas City, Mo. April 21–25.

Southeastern Section—Thomas Jefferson Hotel, Birmingham, Ala. March 18–20.

Canadian Section — Hotel London, London, Ont. March 27–29.

Indiana Section—Purdue University, West Lafayette, Ind. April 4–5.

Montana Section—New Milligan Ho-

tel, Miles City, Mont. April 5–6.
- Ohio Section — Mayflower Hotel, Akron, Ohio. May 9–10.
- Pacific Northwest Section—Portland Hotel, Portland, Ore. May 9–11.
- Florida Section—May 16–18.
- Illinois Section—Congress Hotel, Chicago, Ill. May 22–24.
- New York Section — Ithaca Hotel, Ithaca, N. Y. June 6–7.
- Southwest Section—Tulsa, Okla. October 14–17.

Annual Congress on Medical Education and Licensure. Chicago, Ill. February 12–13.

Association of American Medical Colleges. Ann Arbor, Mich. October 28–30.

Association of Dental Alumni—Columbia University. Alumni Day. Meeting at Alumni House, Columbia University, New York, N. Y. February 12 (9:30 A.M.).

Conference of State and Provincial Health Authorities of North America. Washington, D. C. May 7–8. (May 11, at National Institute of Health.)

Convention for the Revision of the Pharmacopoeia of the United States. Washington, D. C. May. 14.

Council on Medical Education and Hospitals of the American Medical Association — 36th Annual Congress. Federation of State Medical Boards of the United States will participate. Palmer House, Chicago, Ill. February 12–13.

Dairy Industries Supply Association. Atlantic City, N. J. October 21–26.

Dental Centenary Celebration—Marking 100 Years of Dentistry. (Section on Public Health, March 19, 2:00 P.M.) Baltimore, Md. March 18–20.

Greater New York Dietetic Association. Hosac Hall, Academy of Medicine, New York, N. Y. February 7 (8:30 P.M.).

Greater New York Safety Convention—11th Annual. Pennsylvania Hotel, New York, N. Y. April 16–18.

Indiana State Medical Association. French Lick Springs Hotel, French Lick, Ind. October 29–31.

International Congress on Rheumatism—7th. New York, Boston, and Philadelphia. June 1–10.

Institute of Food Technologists—First Meeting. Morrison Hotel, Chicago, Ill. June 17–19.

International Association of Milk Sanitarians. Joint Meeting with the New York State Association of Dairy and Milk Inspectors. Hotel Pennsylvania, New York, N. Y. October 17–19.

International College of Surgeons—United States Chapter. 5th Annual Assembly. Florida Medical Center, Venice, Fla. February 11–14.

Interstate Post-Graduate Medical Assembly. Cleveland, Ohio. October 13–19.

Michigan Public Health Association. Detroit, Mich. October.

Mother's Day. May 12. Tenth annual nation-wide campaign to make maternity safe—Maternity Center Association, New York.

National Association of County Officials. Houston, Tex. April 10–13.

National Association of Housing Officials. William Penn Hotel, Pittsburgh, Pa. May 15–17.

National Biennial Nursing Convention. Bellevue-Stratford Hotel, Philadelphia, Pa. May 11–18.

National Conference of Social Work. Grand Rapids, Mich. May 26–June 1.

National Restaurant Association. Chicago, Ill. October 7–11.

National Safety Council. Chicago, Ill. October 7–11.

National Social Hygiene Day — 4th Annual Observance. February 1.

National Tuberculosis Association. Hotel Statler, Cleveland, Ohio. June 3–6.

New York Tuberculosis and Health Association—Annual Meeting. Joint meeting with the Tuberculosis Sana-

torium Conference of Metropolitan New York. Hotel Pennsylvania, New York, N. Y. March 5, 9:30 A.M. (Afternoon session on heart disease will be held under the auspices of the New York Heart Association.)

Pan American Sanitary Conference—Joint Session with Conference of State and Provincial Health Authorities of North America. Washington, D. C. May 8.

Pan American Union. Celebration of the Fiftieth Anniversary. Washington, D. C. April 14.

Pennsylvania Public Health Association. Philadelphia, Pa. October.

Regional Conference on Social Hygiene—8th Annual. Hotel Astor, New York, N. Y. February 7.

Save Your Vision Week. Sponsored by the American Optometric Association, Inc. Week of March 10.

Southern California Public Health Association—Annual Banquet. University Club, Pasadena, Calif. February 6.

State and Territorial Health Officers with the Surgeon General. Washington, D. C. May 8–9.

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Tenth Annual Year Book

AMERICAN PUBLIC HEALTH ASSOCIATION

1939-1940

AMERICAN PUBLIC HEALTH ASSOCIATION
50 West 50th Street, New York, N. Y.

CONTENTS

GUIDE TO PERSONNEL OF COMMITTEES AND SUB-COMMITTEES OF THE AMERICAN PUBLIC HEALTH ASSOCIATION

NOTE: Where two Sections have committees of the same name, the Section is indicated.

THE AMERICAN PUBLIC HEALTH ASSOCIATION

GOVERNING COUNCIL

OFFICERS 1939–1940

President, Edward S. Godfrey, Jr., M.D., Albany, N. Y.
President-Elect, W. S. Leathers, M.D., Nashville, Tenn.
First Vice-President, Elizabeth L. Smellie, R.N., Ottawa, Ont.
Second Vice-President, Domingo F. Ramos, M.D., Havana, Cuba
Third Vice-President, Wilton L. Halverson, M.D., Pasadena, Calif.
Treasurer, Louis I. Dublin, Ph.D., New York, N. Y.
Chairman of Executive Board, Abel Wolman, Dr.Eng., Baltimore, Md.
Executive Secretary, Reginald M. Atwater, M.D., New York, N. Y.

EXECUTIVE BOARD

Chairman, Abel Wolman, Dr.Eng., Baltimore, Md. (1942)
Walter H. Brown, M.D., Palo Alto, Calif. (1941)
Louis I. Dublin, Ph.D., New York, N. Y. *(Treasurer)*
Edward S. Godfrey, Jr., M.D., Albany, N. Y. *(President)*
John P. Koehler, M.D., Milwaukee, Wis. (1940)
W. S. Leathers, M.D., Nashville, Tenn. *(President-Elect)*
Friend Lee Mickle, Sc.D., Hartford, Conn. (1941)
Harry S. Mustard, M.D., New York, N. Y. (1942)
Thomas Parran, M.D., Washington, D. C. (1940)

ELECTIVE COUNCILORS

Terms Expiring 1940

W. F. Draper, M.D., Washington, D. C.
A. Grant Fleming, M.D., Montreal, Que.
Ira V. Hiscock, Sc.D., New Haven, Conn.
E. V. McCollum, Ph.D., Baltimore, Md.
J. T. Phair, M.B., Toronto, Ont.
John L. Rice, M.D., New York, N. Y.
George C. Ruhland, M.D., Washington, D. C.
William P. Shepard, M.D., San Francisco, Calif.
Wilson G. Smillie, M.D., New York, N. Y.
Huntington Williams, M.D., Baltimore, Md.

Terms Expiring 1941

E. L. Bishop, M.D., Chattanooga, Tenn.
Dorothy Deming, R.N., New York, N. Y.
Naomi Deutsch, R.N., Washington, D. C.
J. A. Doull, M.D., Cleveland, O.
Allen W. Freeman, M.D., Baltimore, Md.
John F. Norton, Ph.D., Kalamazoo, Mich.
J. L. Pomeroy, M.D., Los Angeles, Calif.
Dean Franklin Smiley, M.D., Ithaca, N. Y.
C.-E. A. Winslow, Dr.P.H., New Haven, Conn.
C. C. Young, D.P.H., Lansing, Mich.

Terms Expiring 1942

J. N. Baker, M.D., Montgomery, Ala.
Karl F. Meyer, Ph.D., San Francisco, Calif.
Harry S. Mustard, M.D., New York, N. Y.
George H. Ramsey, M.D., White Plains, N. Y.
W. S. Rankin, M.D., Charlotte, N. C.
Robert H. Riley, M.D., Baltimore, Md.
L. R. Thompson, M.D., Washington, D. C.
W. Frank Walker, Dr.P.H., New York, N. Y.
Robert E. Wodehouse, M.D., Ottawa, Ont.
Hans Zinsser, M.D., Boston, Mass.

SECTION OFFICERS

Health Officers

Chm., Adolph Weinzirl, M.D., Portland, Ore.
Vice-Chm., Malcolm R. Bow, M.D., Edmonton, Alta.
Secy., E. R. Coffey, M.D., Washington, D. C.
Section Council, G. F. Amyot, M.D., Minneapolis, Minn., Edward S. Godfrey, Jr., M.D., Albany, N. Y., John P. Koehler, M.D., Milwaukee, Wis., William P. Richardson, M.D., Chapel Hill, N. C., Henry F. Vaughan, Dr.P.H., Detroit, Mich.

Laboratory

Chm., Harold W. Lyall, Ph.D., Albany, N. Y.
Vice-Chm., Elliott S. Robinson, M.D., Boston, Mass.
Secy., Edmund K. Kline, Dr.P.H., Olean, N. Y.

Vital Statistics

Chm., A. W. Hedrich, Sc.D., Baltimore, Md.
Vice-Chm., R. N. Whitfield, M.D., Jackson, Miss.
Secy., John Collinson, M.D., Washington, D. C.

Engineering

Chm., Earnest Boyce, C.E., Lawrence, Kans.
Vice-Chm., Harry B. Hommon, San Francisco, Calif.
Secy., James Lloyd Barron, C.E., Hempstead, N. Y.

Industrial Hygiene

Chm., Clarence D. Selby, M.D., Detroit, Mich.
Vice-Chm., W. J. McConnell, M.D., New York, N. Y.
Secy., J. J. Bloomfield, Washington, D. C.

Food and Nutrition

Chm., F. W. Fabian, Ph.D., East Lansing, Mich.
Vice-Chm., A. C. Hunter, Ph.D., Washington, D. C.
Secy., Marietta Eichelberger, Ph.D., Chicago, Ill.

Maternal and Child Health

Chm., Martha M. Eliot, M.D., Washington, D. C.
Vice-Chm., Estella F. Warner, M.D., Albuquerque, N. M.
Secy., Richard A. Bolt, M.D., Cleveland, O.

Public Health Education

Chm., Carl A. Wilzbach, M.D., Cincinnati, O.
Vice-Chm., Thomas G. Hull, Ph.D., Chicago, Ill.
Secy., Sally Lucas Jean, New York, N. Y.

Public Health Nursing

Chm., Marion W. Sheahan, R.N., Albany, N. Y.
Vice-Chm., Laura A. Draper, R.N., Minneapolis, Minn.
Secy., Leah M. Blaisdell, R.N., New York, N. Y.

Epidemiology

Chm., James P. Leake, M.D., Washington, D. C.
Vice-Chm., Filip C. Forsbeck, M.D., Cincinnati, O.
Secy., Ernest L. Stebbins, M.D., Albany, N. Y.

REPRESENTATIVES OF AFFILIATED SOCIETIES AND BRANCHES

Public Health Associations:
J. D. Dunshee, M.D., Arizona
Amos L. Beaghler, M.D., Colorado
Benjamin G. Horning, M.D., Connecticut
Noble A. Upchurch, M.D., Florida
M. E. Winchester, M.D., Georgia
————————, Idaho
Harold D. Chope, M.D., Massachusetts
John Lavan, M.D., Michigan
W. Scott Johnson, Missouri
Myrtle Greenfield, New Mexico
Clarence L. Scamman, M.D., New York City
Guy S. Millberry, D.D.S., Northern California
G. D. Lummis, M.D., Ohio Federation of Public Health Officials
William W. McFarland, M.D., Pennsylvania
James A. Hayne, M.D., South Carolina
Raymond V. Stone, D.V.M., Southern California
————————, Tennessee
V. M. Ehlers, Texas
John L. Jones, M.D., Utah
W. Brownley Foster, M.D., Virginia
Bruce H. Pollock, M.D., West Virginia
J. J. Sippy, M.D., Western Branch
F. J. Underwood, M.D., Southern Branch

CONSTITUTION AND BY-LAWS
AMERICAN PUBLIC HEALTH ASSOCIATION

As Adopted at the Fifty-eighth Annual Meeting, and Amended at the Sixty-eighth Annual Meeting

CONSTITUTION

ARTICLE I Name

The name of this Association, incorporated under the laws of Massachusetts, is the American Public Health Association.

ARTICLE II Object

The object of this Association is to protect and promote public and personal health.

ARTICLE III Governing Council

A. *Composition:* There shall be a Governing Council consisting of:

1. The officers of the Association and the elective members of the Executive Board.

2. Thirty members of the Council, to be elected by and from the Fellowship of the Association, for three-year terms, one-third retiring each year. These members of the Council shall be nominated and elected as provided for in the By-laws.

If one of these members is elected a Section Chairman, Vice-Chairman, or Secretary, or appointed the representative of an Affiliated Society, a new Councilor to fill such vacancy shall be elected by the Governing Council.

3. The Chairman, Vice-Chairman, and Secretary of each Section.

4. Representatives to be appointed by Affiliated Societies as provided for in the By-laws. Such representatives shall be Fellows of the American Public Health Association.

5. The elective members of the Council of the Health Officers Section.

6. A representative to be designated by each regional branch. Such representative shall be a Fellow of the American Public Health Association.

B. *Terms:* Terms of Councilors shall begin at the end of the annual meeting when elected, and shall terminate at the end of the annual meeting at expiration of term; provided that Councilors shall have the right to attend meetings of the Council in an advisory capacity as soon as elected.

C. *Reëlection:* After two consecutive terms, an elective Councilor shall be ineligible for reelection to the Council during one Association year.

D. *The Officers of the Association* shall be the officers of the Council.

E. *Functions:* The functions of the Council shall be:

1. To establish policies for the Association and for the guidance of the Executive Board and the officers.

2. To establish Sections of the Association; to combine or discontinue them when necessary; to maintain coördination among them; and to formulate general rules governing the policies of the Sections.

3. To submit to the vote of the Association all resolutions which have received the approval of the Governing Council.

4. To elect and establish qualifications for Affiliated Societies, Fellows, and Honorary Fellows as provided in the By-laws.

5. To elect the Executive Board and the officers of the Association.

6. To receive from the Executive Board at its first session, at the time and place of the annual meeting of the Association, a definitely formulated statement of a program of the major activities proposed for the ensuing year. To determine at the annual meeting of the Association in general outline the allocation of Association moneys in the budget for the ensuing year. To require a report from the Chairman of the Executive Board in which the work, the accomplishments and the financial status of the Association during the year preceding such annual meeting shall be reviewed.

7. To publish after each of its meetings an abstract of the minutes of such meetings.

F. *A Quorum* of the Council shall consist of ten Councilors.

G. *Meetings* of the Council shall be called by the Executive Secretary at the request of the President, or at the request in writing of any twelve Councilors. In the latter case, the call to meeting, issued at least twenty days in advance, shall state the purpose of the meeting.

ARTICLE IV Officers

The officers of this Association shall be a President, a President-elect, three Vice-Presidents, an Executive Secretary, a Treasurer, and the Chairman of the Executive Board. The officers, with the exception of the Chairman of the Executive Board and the Executive Secre-

tary, shall be elected by written ballot of the Governing Council as provided in this article and in the By-laws. The President-elect shall serve as such from the close of the annual meeting at which he was elected to the close of the next annual meeting, when he shall automatically become President. As President he shall serve to the close of the next succeeding annual meeting. Other officers shall serve from the close of the annual meeting when elected, until the close of the next annual meeting, and all officers shall serve in any case until their successors are elected and qualified. A majority vote of the Councilors voting shall be required to elect, and if no candidate receives a majority vote on the first ballot, the candidate receiving the smallest number of votes shall be dropped after each ballot in succession until a majority vote is obtained. The Chairman of the Executive Board and the Executive Secretary shall be elected by the Executive Board, which Board shall define the duties and authority of these officers, respectively.

ARTICLE V AMENDMENTS

This Constitution may be amended by a two-thirds vote of the Fellows of the Association present and voting at an annual meeting, provided that the specific amendment to be acted upon is published in the official publication of the Association not less than thirty days prior to the meeting, and provided further that the amendment has received the approval of the Governing Council.

BY-LAWS

ARTICLE I MEMBERSHIP AND DUES

A. There shall be eight classes of constituents. Of these, Fellows may be elected only from the United States, Canada, Mexico and Cuba. The other seven classes of constituents may be elected from any country. The respective appellations, qualifications for election, and dues shall be as follows:

1. *Fellows:* Only professional health workers, from the United States and its possessions, Canada, Mexico and Cuba, who have been members of the Association for at least two years, and of established professional standing (whether employed by public or private agencies or in independent private practice), shall be eligible for election as Fellows, provided that a member shall be not less than thirty years old at the time the application for Fellowship is made, and provided, further, that the following persons shall be considered to have an established standing in the profession of public health, namely:

a. A person who has attained the degree of Doctor of Public Health, Doctor of Science in Public Health, Doctor of Philosophy in Public Health, or other equivalent degree, according to standards approved by the Executive Board of the American Public Health Association.

b. A person who has attained an àcademic or professional degree involving training in public health, and who has been regularly engaged in public health work for four years, having rendered meritorious service in the public health profession, either as a health officer or in responsible charge of work in a state or municipal department of health or other official public health organization.

c. A person who has done notable original work in public health or preventive medicine of a character to give him a recognized standing equivalent to that required for Fellows under paragraphs "a" and "b."

d. A person regularly engaged in public health work for at least five years, who has given evidence of special proficiency in the service of an official or unofficial public health organization, and who has attained a professional standing equivalent to that required for Fellows under paragraphs "a" and "b."

e. A teacher of public health or one of its constituent sciences. As such he shall have attained distinction as an expounder of the principles of public health or its constituent sciences and he shall have had at least five years' experience as a teacher of public health subjects. Any years of experience as defined in paragraphs "b" and "d" that the applicant may have had shall be considered the equivalent of the same number of years experience as a "teacher."

f. A person not covered by the above, who has made substantial contributions to public health work in his chosen branch of public health service, and who has attained a professional standing equivalent to that required for Fellows under paragraphs "a" and "b."

The application for Fellowship shall be made on an approved form and shall be sponsored by two Fellows of the Association who shall be Fellows of the Section with which affiliation is desired, provided, however, that when affiliation with a Section is not desired, the sponsors may be any two Fellows in good standing in the Association. Fellows without Section affiliation shall be known as unaffiliated Fellows.

When the application has been duly sponsored and otherwise completed, it shall be transmitted to the Administrative Office of the Association, which shall make note thereon of such knowledge as it may have concerning the standing of the applicant in the Association. The application shall be forwarded by the Administrative Office to the Secretary of the Section in which affiliation is desired, for the approval of the Section Council, and when acted upon by the Section Council, it shall be returned to the Administrative Office by the Secretary of the Section, after he has made endorsement on the application of the action of the Section Council. When the application is for unaffiliated Fellowship, the Executive Board of the Association shall act in place of the Section Council. When the application has been approved by a majority of the Section Council or the Executive Board, as above provided, it shall be voted upon by the Governing Council, provided the name of the applicant shall have been officially published at least fifteen days in advance, and provided further that the application shall have been approved by the Committee on Eligibility.

A Fellow may belong to and vote in only one Section, but such affiliation may be transferred to another Section if approved by vote of a majority of the Council of the latter Section. Unaffiliated Fellows may become affiliated with a Section if approved by vote of a majority of the Council of the Section with which affiliation is desired.

The right to hold office or to serve as chairman of a committee in the Association shall be limited to the Fellows of the Association, whether Section Fellows or unaffiliated Fellows. The right to hold office or to serve as chairman of a committee in a Section shall, however, be limited to the respective Fellows in such Section. This provision shall not prevent the election of a Vice-President of the Association who may not be a Fellow.

The dues of Fellows shall be $10.00 per year.

2. *Honorary Fellows:* Honorary Fellows may be elected by the Governing Council for distinguished service in public health. Honorary Fellowship shall not include voting power or payment of dues.

3. *Members:* Persons professionally engaged or interested in public health work shall be eligible for election as members when sponsored by two members or Fellows of the Association. They may serve on committees, except as chairmen. Dues $5.00 per year. A member may belong to only one Section, but such affiliation may be transferred to another Section if approved by vote of a majority of the Council of the Section to which change is desired. Unaffiliated members may become affiliated with a Section if approved by vote of a majority of the Council of the Section with which affiliation is desired.

4. *Sustaining Members:* Individuals or corporations interested in public health may be elected to Sustaining Membership. Dues $50.00 or more per year.

5. *Affiliated Societies:* A state or provincial public health association or similar regional society including more or less than a state, primarily composed of professional public health workers and organized for the same general objects as the American Public Health Association, may be elected as an Affiliated Society, provided that not less than twenty of its active members and at least one-half of its active members are members or Fellows of the American Public Health Association. Not more than one such society shall be admitted from the same area.

A society applying for affiliation shall submit a copy of its constitution and by-laws, its last annual budget, a roster of its members and such other evidences of its qualifications as may be required. It shall submit annually and at other times such reports on its financial standing, membership and other matters as may be required by the Executive Board of the American Public Health Association.

The Committee on Eligibility shall consider all applications for affiliation and report its recommendations to the Governing Council.

The annual dues of Affiliated Societies shall be one per cent of their gross annual income, the minimum dues per society being $10.00 per year.

For every Fellow or member paying annual dues to the American Public Health Association, the American Public Health Association shall remit to the Affiliated Society of which such person is a member the sum of $1.00 per annum.

6. *Associated Organizations:* The Governing Council at its discretion may recognize as associated organizations other autonomous agencies constituting professional societies.

7. *Life Members:* Upon the recommendation of the Committee on Eligibility any individual member of the Association may be elected a member for life. Election to this grade shall not affect the privileges held by such individual in his previous grade of membership. The dues for Life Members shall be $100.00, payable within one year after election, and this payment by such member shall exempt him from any further dues.

8. *Regional Branches:* The Governing Coun-

cil may at its discretion establish regional branches of the Association.

B. *Election:* The election of Fellows (see A1 above), Honorary Fellows, Life Members, and Affiliated Societies shall be by the Governing Council.

The election of members and Sustaining Members shall be by the Executive Board.

Three-fourths of the votes cast shall be requisite for election.

Upon the recommendation of the Committee on Eligibility the Governing Council may discontinue the membership, Fellowship or affiliation of any constituent. Three-fourths of the votes cast shall be necessary for such action.

C. *Dues:* Dues are payable annually in advance. All constituents paying dues shall be entitled to receive the AMERICAN JOURNAL OF PUBLIC HEALTH and/or, such other publications as may be designated by the Executive Board, which shall determine the proportion of dues to be devoted to this purpose.

Constituents of any class whose dues are unpaid for six months or more shall be considered not in good standing. Constituents not in good standing shall not be entitled to vote, hold office or enjoy other privileges or powers of membership. Good standing may be resumed upon the payment of all arrears and dues in advance for one year, provided, however, the lapsed period is not greater than one year. The Administrative Office shall notify by registered mail all constituents who have been in arrears for a period of eleven months. The names of constituents in any class whose dues remain unpaid for one year or more shall be presented to the Executive Board which shall order the names of such constituents stricken from the membership roll, provided, however, such constituents have been duly notified as hereinbefore provided in this paragraph. Constituents whose names have been stricken from the rolls in this manner may be again admitted in the manner provided for the election of new constituents in the class for which they make application, provided such person or organization complies with the eligibility requirements at the time the new application is made.

If, in the opinion of the Executive Board, any member or Fellow of the Association be found (hereafter) to have permitted the use of his name, or otherwise to have allowed himself to be quoted or used for illustration in the advertising of a commercial product, in such a manner as to reflect discredit upon the Association, his Fellowship or membership in the Association shall thereupon be terminated. The application of this article shall not be retroactive.

ARTICLE II GOVERNING COUNCIL

The thirty members of the Governing Council designated in Article III, Section A, Paragraph 2 of the Constitution, shall be nominated and elected as follows: There shall be a Nominating Committee composed of one Fellow elected by each Section at the preceding annual meeting, and an additional Fellow designated by the Executive Board, the latter serving as Chairman. This committee shall present to the Administrative Office at least two months before the next annual meeting the names of at least twenty and not more than thirty Fellows of the Association selected with due regard to geographical and membership considerations as nominees for the Governing Council. The Administrative Office shall publish this list to the membership. Upon the petition of twenty-five Fellows the Nominating Committee shall add the name of any Fellow to this list provided such petition is received fifteen days before the annual meeting. The time for closing the polls shall be determined each year by the Executive Board. The Fellows receiving the highest number of votes on a written ballot cast by the Fellows present and voting at the annual meeting shall be declared elected to fill existing vacancies. Should two or more candidates receive the same number of votes, the Executive Board shall, when necessary, determine by written ballot the order of precedence.

ARTICLE III EXECUTIVE BOARD

A. *Composition:* There shall be an Executive Board of nine members elected by the Governing Council, six of whom shall be at the time of their election past or present members of the Governing Council, and three of whom shall be the President, the President-elect, and the Treasurer.

1. When a Fellow accepts membership on the Executive Board, any position he may hold on any of the standing committees of the Association will thereupon automatically become vacant. This provision will become effective with the close of the annual meeting at which this amendment is adopted, at which time Fellows holding memberships on the Executive Board and any standing committees will indicate their preference for one or the other.

2. If a vacancy on the Executive Board shall occur after the annual meeting because of the preference of an elected member to retain his standing committee membership, the President shall designate a nominating committee for this purpose from the membership of the Governing Council and this committee shall nominate not less than three

candidates for the vacancy, from whom the candidate receiving the highest number of votes in a mail ballot by the Governing Council shall be declared elected to the Executive Board to fill the vacancy.

B. *Terms:* The terms of the President, the President-elect, and the Treasurer as Executive Board members shall be one year each. The terms of the other members shall be three years each, expiring in rotation, two each year. The members of the Executive Board whose terms have not expired shall at the time of the adoption of this amendment continue in office until the expiration of the term for which they have been elected. At the annual meeting at which this amendment is adopted one member shall be elected for a term of two years and two members for a term of three years. Should a vacancy occur the Governing Council shall elect a member to fill such vacancy for the unexpired term. The terms of the members of the Executive Board shall begin at the end of the annual meeting at which they have been elected, and shall continue until the end of the annual meeting at expiration of term, provided that newly elected members of the Board shall have the right to attend meetings as soon as elected, and shall have no vote until installed.

C. *Reëlection:* After two consecutive terms of three years a member of the Executive Board shall be ineligible for reëlection during one Association year. This provision shall not apply to an officer of the Association.

D. *Officers:* The Executive Board shall elect from its own membership a Chairman who shall serve in that capacity for such term as the Executive Board shall determine. It shall also designate such other officers of the Board as it may require for the conduct of its business.

E. *Duties:*

1. To direct the administrative work of the Association.
2. To act as Trustee of the Association's properties.
3. To plan methods for the procurement of funds.
4. To recommend budgets for the Association's work.
5. To conform to the policies of the Governing Council in the conduct of its work.
6. To appoint the members of the Standing Committees and to authorize and confirm the appointment of all other Association committees.
7. To transmit a report of its proceedings and transactions to the Governing Council at least thirty days before each annual meeting.
8. In general to carry out the policies of the Governing Council between meetings of the latter.

F. *A Quorum* of the Executive Board shall consist of four members.

ARTICLE IV OFFICERS

The officers elected by the Governing Council shall be nominated from the floor by that body.

ARTICLE V COMMITTEES

There shall be four standing committees of the Association as follows:

1. Committee on Eligibility.
2. Committee on Administrative Practice.
3. Committee on Research and Standards.
4. Committee on Professional Education.

A. *Organization:* All of the Standing and Special Committees of the Association shall be authorized and appointed by the Executive Board unless otherwise provided for in these By-laws. Unless otherwise provided for all Section Committees shall be named by the respective Sections, and the personnel of such committees shall be confirmed by the Executive Board. The appointments of all Association and Section Committees unless otherwise provided for in these By-laws shall expire at the next annual meeting. The Chairmen of the Standing Committees shall be designated by the Executive Board. The Standing Committees shall designate from among their membership such other officers as they may require for the conduct of their business. Each committee shall control its policies within limitations prescribed by the Governing Council and the Executive Board.

The Executive Secretary shall be a member, ex-officio, of all Standing Committees, and shall serve as Secretary of each such committee.

B. *Composition and Functions:*

1. The Committee on Eligibility shall consist of one Fellow to be elected by each Section and an additional Fellow elected by the Executive Board. At the time of the adoption of this amendment the persons holding appointments as Section membership representatives shall serve for the remainder of their terms as members of the Committee on Eligibility. Thereafter, those designated to fill vacancies shall serve for a term of two years.

This committee shall pass upon the eligibility of Fellows, members and other constituents in accordance with the provisions of the By-laws.

2. The Committee on Administrative Practice shall consist of fifteen Fellows as follows: Twelve shall be designated by the Executive Board to serve for a term of four years, the terms of three members of this committee expiring each year. The remaining three members of this Committee shall be elected annually by and from the Fellows of the Association, affiliated with the Health Officers Section.

This committee shall engage in the collection of information regarding current public health practices and analyze the material obtained to derive standards of organization and achievement. The findings and standards may be made available to public health workers through publications, information and field service under such conditions as the committee may establish. No standards shall be promulgated as the official and authorized judgment of the Association except with the approval of the Governing Council.

3. The Committee on Research and Standards shall consist of fifteen Fellows representative of the various Sections of the Association appointed by the Executive Board. In the beginning the Executive Board shall designate five who shall serve for a term of one year, five for two years, and five for three years. Thereafter members shall serve for a term of three years.

This committee shall be responsible for carrying out research and the development of standards in the technical branches of public health service, and coördinate such research and standardization. This committee shall also be charged with the duty of reviewing from time to time standards already established. No standards shall be promulgated as the official and authorized judgment of the Association except with the approval of the Governing Council.

4. The Committee on Professional Education shall consist of ten Fellows appointed by the Executive Board. At the time of the adoption of this amendment the Executive Board shall appoint ten Fellows, two to serve for one, two for two, two for three, two for four, and two for five years respectively. Thereafter, members shall serve for a term of five years.

This committee shall be responsible for carrying out research and the development of standards for professional education and training in public health work and shall perform such other functions as may be delegated to the committee by the Governing Council with the view of maintaining professional qualifications of high standard. No standards shall be promulgated as the official and authorized judgment of the Association except with the approval of the Governing Council.

ARTICLE VI MEETINGS OF THE ASSOCIATION

There shall be at least one annual meeting of the Association, held at a place to be selected by the Governing Council. Special meetings of the Association may be called by a majority vote of the Governing Council, the Executive Board, or the Association.

ARTICLE VII SECTIONS

The Executive Board shall approve rules and regulations relating to the government of the Sections, and to the appointment of administrative committees. Sections shall elect their own officers.

Nominating Committee: The Section Chairman with the advice of the Section Council shall appoint a Committee on Nominations at least fifteen days before each annual meeting. The Section Secretary shall be a member of such Committee.

The names of the members of the Committee on Nominations shall be announced at the first meeting of the Section, at each annual meeting of the Association. The Committee on Nominations shall present at the second meeting of the Section a list of nominees for the Section offices, and for membership in the Section Council; provided that if the name of any Fellow be transmitted to the Nominating Committee over the signature of ten Fellows of the Section prior to the second meeting of the Section, the Nominating Committee shall add the name of such Fellow to its own list of nominees.

A. *Officers* of each Section shall be a Chairman, a Vice-Chairman, and a Secretary. The Chairman, Vice-Chairman, and Secretary shall be the representatives of the Section to the Governing Council of the Association.

B. *Terms:* New terms begin and old terms expire at the end of annual meetings. After five consecutive years in any elective Section office, except that of Secretary, a member shall be ineligible to reëlection to that office during one Association year.

C. *The Chairman* shall preside at meetings of the Section.

D. *The Vice-Chairman* shall preside at meetings of the Section in the absence of the Chairman.

E. *The Secretary* of the Section shall prepare the scientific program of the Section for the annual meeting, subject to the recommendations of the Section Council, and he shall submit same to the Administrative Office and shall keep the minutes, and other records of the Section, and shall transmit to the Secretary of the Association a copy of the minutes of both business and scientific sessions as soon as practicable there-

after. When unable to be present at meetings, he shall thoroughly instruct a substitute as far in advance of the meeting as possible.

F. *Section Council:* There shall be a Section Council composed of the three officers of the Section and five members, who shall be Fellows of the Section.

Terms of members of the Section Council shall be five years each. In the beginning one shall serve for one year, one for two, one for three, one for four, and one for five years.

Duties of the Section Council shall be:

1. To recommend papers, and to make general recommendations in relation to the annual meeting program.
2. To advise on Section membership.
3. To advise on Section policies.
4. To submit annually to the Governing Council through the Executive Board a report of the transactions of the Section.
5. To report annually to the Governing Council through the Executive Board on the plans, scope and policy of the Section during the succeeding year.
6. To formulate rules of procedure for the Section.
7. To approve and transmit to the Governing Council resolutions originating in the Section.
8. To advise on the publication of papers and reports presented at the Section meetings.
9. To advise with respect to the appointment of technical committees, sub-committees or Section representatives on committees of the Association.

ARTICLE VIII FINANCES

All remittances to the Association shall be deposited to the account of the Treasurer. The Treasurer shall be custodian of investments of the Association and shall disburse funds in accordance with duly authorized vouchers. With the approval of the Executive Board he may establish a drawing account for the Executive Secretary, who shall send to members of the Executive Board a financial summary of receipts and disbursements each month. Once each month, or oftener if called for, he shall also forward to the Treasurer and President an itemized statement of all expenditures. The Executive Secretary and the Treasurer shall be bonded at the expense of the Association in an amount to be determined by the Executive Board. The books of the Association shall be audited annually by certified public accountants, to be appointed by the Executive Board.

ARTICLE IX PUBLICATIONS

All publications of the Association and of its Sections shall be issued under the direction of the Executive Board. The Executive Board shall appoint a Managing Editor of the official journal and an Editorial Board of not less than five members, to serve at the pleasure of the Executive Board. All papers and reports for the annual meetings are to be accepted with the understanding that they shall be the property of the Association for publication, unless this right is waived by the Managing Editor.

ARTICLE X AMENDMENTS

These By-laws may be amended by a two-thirds vote of those voting on the Governing Council during the annual meeting, provided that twenty-four hours prior written notice thereof has been given. The By-laws may further be amended by a two-thirds vote of those voting at any meeting of the Governing Council called for the purpose, provided that notice thereof shall have been given at least fifteen days prior to such meeting.

ANNUAL MEETINGS

Preliminary Meeting	New York, N. Y., April 18	1872
" "	Long Branch, N. J., September 12	1872
1st Annual Meeting	Cincinnati, O., May 1–3	1873
2d " "	New York, N. Y., November 11–14	1873
3d " "	Philadelphia, Pa.	1874
4th " "	Baltimore, Md.	1875
5th " "	Boston, Mass.	1876
6th " "	Chicago, Ill.	1877
7th " "	Richmond, Va.	1878
8th " "	Nashville, Tenn.	1879
9th " "	New Orleans, La.	1880
10th " "	Savannah, Ga.	1881
11th " "	Indianapolis, Ind.	1882
12th " "	Detroit, Mich.	1883
13th " "	St. Louis, Mo.	1884
14th " "	Washington, D. C.	1885
15th " "	Toronto, Ont.	1886
16th " "	Memphis, Tenn.	1887
17th " "	Milwaukee, Wis.	1888
18th " "	Brooklyn, N. Y.	1889
19th " "	Charleston, S. C.	1890
20th " "	Kansas City, Mo.	1891
21st " "	Mexico City, Mex.	1892
22d " "	Chicago, Ill.	1893
23d " "	Montreal, Que.	1894
24th " "	Denver, Colo.	1895
25th " "	Buffalo, N. Y.	1896
26th " "	Philadelphia, Pa.	1897
27th " "	Ottawa, Ont.	1898
28th " "	Minneapolis, Minn.	1899
29th " "	Indianapolis, Ind.	1900
30th " "	Buffalo, N. Y.	1901
31st " "	New Orleans, La.	1902
32d " "	Washington, D. C.	1903
33d " "	Havana, Cuba	1904
34th " "	Boston, Mass.	1905
35th " "	Mexico City, Mex.	1906
36th " "	Atlantic City, N. J.	1907
37th " "	Winnipeg, Man.	1908
38th " "	Richmond, Va.	1909
39th " "	Milwaukee, Wis.	1910
40th " "	Havana, Cuba	1911
41st " "	Washington, D. C.	1912
42d " "	Colorado Springs, Colo.	1913
43d " "	Jacksonville, Fla.	1914
44th " "	Rochester, N. Y.	1915
45th " "	Cincinnati, O.	1916
46th " "	Washington, D. C.	1917
47th " "	Chicago, Ill.	1918
48th " "	New Orleans, La.	1919
49th " "	San Francisco, Calif.	1920
50th " "	New York, N. Y.	1921
51st " "	Cleveland, O.	1922
52d " "	Boston, Mass.	1923
53d " "	Detroit, Mich.	1924
54th " "	St. Louis, Mo.	1925
55th " "	Buffalo, N. Y.	1926

ANNUAL MEETINGS (Cont.)

56th Annual Meeting	Cincinnati, O.	1927
57th " "	Chicago, Ill.	1928
58th " "	Minneapolis, Minn.	1929
59th " "	Fort Worth, Tex.*	1930
60th " "	Montreal, Que.	1931
61st " "	Washington, D. C.	1932
62d " "	Indianapolis, Ind.	1933
63d " "	Pasadena, Calif.	1934
64th " "	Milwaukee, Wis.	1935
65th " "	New Orleans, La.†	1936
66th " "	New York, N. Y.	1937
67th " "	Kansas City, Mo.	1938
68th " "	Pittsburgh, Pa.	1939
69th " "	Detroit, Mich.	1940

* Post-Convention Meeting, Mexico City, Mex., 1930.
† Post-Convention Meeting, Havana, Cuba, 1936.

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Gonorrhea and the Gonococcus—Charles M. Carpenter, M.D., University of Rochester, Rochester, N. Y.
Laboratory Diagnosis of Rabies—Thomas F. Sellers, M.D., State Board of Health, Atlanta, Ga.
Laboratory Diagnostic Procedures in the Recognition of Various Food Poisonings—S. A. Koser, Ph.D., University of Chicago, Chicago, Ill.
Laboratory Methods for the Diagnosis of Fungus Diseases—W. D. Stovall, M.D., State Laboratory of Hygiene, Madison, Wis.
Meningitis and Meningococcus—Sara E. Branham, M.D., National Institute of Health, Washington, D. C.
Recognition and Significance of Hemolytic Streptococci in Infectious Diseases—Julia M. Coffey, State Department of Health, Albany, N. Y.
Recognition of Pneumococcus Types Associated with Pneumonia—Wheeler D. Sutliff, M.D., Department of Health Laboratories, New York, N. Y.
Serological and Bacteriological Procedures in the Diagnosis of Enteric Fevers—Marion B. Coleman, State Department of Health, Albany, N. Y.
Serological, Bacteriological and Other Biological Procedures in the Diagnosis of Undulant Fever—G. D. Cummings, Ph.D., State Department of Health, Lansing, Mich.
Serological Tests for the Diagnosis of Syphilis—Ruth Gilbert, M.D., State Department of Health, Albany, N. Y.
Studies on the Toxicity of Dyes for Bacteria—Edmund K. Kline, Dr.P.H., Cattaraugus County Department of Health, Olean, N. Y.
Tuberculosis and the Tubercle Bacillus—A. L. MacNabb, D.V.M., Department of Health, Toronto, Ont.
Tularemia and Bacterium Tularense—J. G. McAlpine, Ph.D., District State Laboratories, Montgomery, Ala.
Typhus Fever and Laboratory Methods for Its Recognition—Henry Welch, Ph.D., U. S. Food and Drug Administration, Washington, D. C.
Whooping Cough and B. Pertussis—Pearl L. Kendrick, Sc.D., State Department of Health, Grand Rapids, Mich.

Associate Referee[2] *for:*
Complement-Fixation Test for Syphilis—Elizabeth Maltaner, State Department of Health, Albany, N. Y.
Laboratory Diagnosis of Diphtheria—Donald T. Fraser, M.B., D.P.H., University of Toronto, Toronto, Ont.
Laboratory Diagnosis of Rabies—Harry Carnes, State Department of Health, Atlanta, Ga.
Laboratory Methods for the Diagnosis of Fungus Diseases—Lois Almon, Ph.D., State Laboratory of Hygiene, Madison, Wis.
Studies on the Toxicity of Dyes for Bacteria—Cassandra Ritter, Water and Sewage Laboratory, University of Kansas, Lawrence, Kans.

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Tuberculosis and the Tubercle Bacillus—M. H. Brown, M.D., University of Toronto, Toronto, Ont.

Tularemia and Bacterium Tularense—George D. Brigham, Ph.D., U. S. Quarantine Station, Mobile, Ala.

Whooping Cough and B. Pertussis—George McL. Lawson, M.D., Dr.P.H., Box 1113, Charlottesville, Va., and J. J. Miller, M.D., 2361 Broadway, San Francisco, Calif.

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Chemical Methods for Water—A. M. Buswell, Ph.D., Water Survey, 57 Chemical Building, Urbana, Ill., and S. T ... well, State Department of
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Colon Group—A. J. Slack, M.D., Institute of Public Health, London, Ont.

Methods of Counting Bacteria in Dairy Products—A. H. Robertson, Ph.D., State Department of Agriculture and Markets, Albany, N. Y.

Methods of Isolating Specific Types of Bacteria in Dairy Products—Mac H. McCrady, 89 Notre Dame East, Montreal, Que.

Associate Referee [2] *for:*

Bacteriological Methods of Examining Ice Cream—F. W. Fabian, Ph.D., Michigan State College, East Lansing, Mich.

Microbiological Methods for Examining Butter—E. H. Parfitt, Ph.D., Purdue University, Lafayette, Ind.

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Standard Methods Committee on Analyzing Frozen Desserts (Joint with the Committee of the Food and Nutrition Section)

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Referee [1] *for:*

Chemical Analysis of Frozen Desserts and Ingredients—J. H. Shrader, Ph.D.,

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Microbiological Examination of Ingredients—F. W. Fabian, Ph.D., Michigan State College, East Lansing, Mich.

Sediment Testing of Frozen Desserts and Ingredients—Milton E. Parker, 1526 S. State Street, Chicago, Ill.

Stabilizers and Gelatine in Frozen Desserts—James Gibbard, Department of Pensions and National Health, Ottawa, Ont.

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Chemical Determinations of Milk Solids in Frozen Desserts—O. A. Ghiggoile, State Department of Agriculture, Sacramento, Calif.

Chemical Determinations of Modified Babcock Methods for Frozen Desserts—W. H. Martin, Kansas State College, Manhattan, Kans.

Chemical Determinations for Phosphatase Test for Frozen Desserts—George Jaggard, 1037 Park Avenue, Collingswood, N. J.

Sampling for Chemical Determinations—P. H. Tracy, Ph.D., University of Illinois, Urbana, Ill.

Chemical Determinations of Stabilizers in Frozen Desserts—F. Leslie Hart, U. S. Food and Drug Administration, San Francisco, Calif.

Microbiological Examination of Condensed and Evaporated Milk—Paul A. Downs, Ph.D., University of Nebraska, Lincoln, Neb.

Microbiological Examination of Dry Milk—Paul S. Prickett, Ph.D., Evansville, Ind.

Microbiological Examination of Eggs—Roy Schneiter, Food Division, U. S. Food and Drug Administration, Washington, D. C.

Microbiological Examination of Flavors, Colors, Fruits and Nuts—M. J. Prucha, Ph.D., University of Illinois, Urbana, Ill.

Microbiological Examination of Sugar—H. H. Hall, U. S. Department of Agriculture, Washington, D. C.

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C.-E. A. Winslow, Dr.P.H.

Sub-Committee on Chemical Procedures
Frederick H. Goldman, Ph.D., *Chairman,* National Institute of Health, Washington, D. C.
Allan L. Coleman
Hervey E. Elkins
Helmuth H. Schrenk, Ph.D.
Clayton A. Smucker

Sub-Committee on Dust Procedures
J. J. Bloomfield, *Chairman,* U. S. Public Health Service, Washington, D. C.
Theodore F. Hatch
Charles R. Williams, Ph.D.

Sub-Committee on Bacteriological Procedures
William F. Wells, *Chairman,* School of Medicine, University of Pennsylvania, Philadelphia, Pa.
Prof. Earle B. Phelps
C.-E. A. Winslow, Dr.P.H.

Committee on Standard Practices in the Problem of Compensation of Occupational Diseases (allocated to Committee on Research and Standards)
Henry H. Kessler, M.D., *Chairman,* State Department of Labor, Newark, N. J.
Manfred Bowditch
Bernard S. Coleman
Leonard J. Goldwater, M.D., Sc.D.
Emery R. Hayhurst, M.D.
Eleanor Rantoul
R. R. Sayers, M.D.

Committee on Lead Poisoning (allocated to Committee on Research and Standards)
Robert A. Kehoe, M.D., *Chairman,* University of Cincinnati, Cincinnati, O.
Elston L. Belknap, M.D.
W. C. Dreessen, M.D.
George H. Gehrmann, M.D.
Milton H. Kronenberg, M.D.
May R. Mayers, M.D.
William P. Yant

Committee on Pneumoconiosis (allocated to Committee on Research and Standards)
R. R. Sayers, M.D., *Chairman,* U. S. Public Health Service, Washington, D. C.
Leroy U. Gardner, M.D.
Leonard Greenburg, M.D.
Emery R. Hayhurst, M.D.
A. J. Lanza, M.D.

Committee on Industrial Anthrax (allocated to Committee on Research and Standards)
Henry Field Smyth, M.D., Dr.P.H., *Chairman,* University of Pennsylvania, Philadelphia, Pa.
Volney S. Cheney, M.D.
Walter D. Higgins, M.D.

Committee on Volatile Solvents (allocated to Committee on Research and Standards)
Henry F. Smyth, Jr., Ph.D., *Chairman,* Mellon Institute, Pittsburgh, Pa.
George H. Gehrmann, M.D.
Carey P. McCord, M.D.
Henry Field Smyth, M.D., Dr.P.H.
Zolton T. Wirtschafter, M.D.
William P. Yant

Committee on Health Education of Industrial Workers (unallocated)
————————, *Chairman*
Leverett D. Bristol, M.D.
W. J. McConnell, M.D.

Food and Nutrition Section

Committee on Microbiological Examination of Foods (allocated to Committee on Research and Standards)
Fred W. Tanner, Ph.D., *Chairman,* University of Illinois, Urbana, Ill.
M. T. Bartram, Ph.D.
James A. Berry, Ph.D.
Edwin J. Cameron, Ph.D.
James E. Fuller, Ph.D.
Harry E. Goresline, Ph.D.
Emanuel Kaplan, Sc.D.
Milton L. Laing
Carl S. Pederson, Ph.D.
Nathan H. Sanderson, Jr.
Roy Schneiter
Oscar B. Williams, Ph.D.
Gerald A. Fitzgerald
Francis P. Griffiths, Ph.D.
Marjorie M. Heseltine
George J. Hucker, Ph.D.
Albert C. Hunter, Ph.D.
George H. Marsh
Michael G. O'Connor
Julian H. Toulouse, Ph.D.

Committee on Milk and Dairy Products (allocated to Committee on Research and Standards)
Merrill J. Mack, *Chairman,* Massachusetts State College, Amherst, Mass.
D. J. Babcock
Oscar Boisvert
W. D. Dotterrer
Marietta Eichelberger, Ph.D.
George W. Grim, V.M.D.
J. A. Keenan, Ph.D.
William B. Palmer
George W. Putnam
D. M. Roger

Committee on Foods (Except Milk) (allocated to Committee on Research and Standards)
Donald K. Tressler, Ph.D., *Chairman,* New York Agricultural Experiment Station, Geneva, N. Y.
Edward MacK. Chace
J. O. Clarke
Cecil G. Dunn, Ph.D.

Committee on Participation in Standard Methods (allocated to Committee on Research and Standards)
F. C. Blanck, Ph.D., *Chairman,* 1062 Progress St., Pittsburgh, Pa.
Bernard E. Proctor, Ph.D.
J. H. Shrader, Ph.D.

Committee on Assay of Foods (allocated to Committee on Research and Standards)
Henry T. Scott, Ph.D., *Chairman,* Wisconsin Alumni Research Foundation, Madison, Wis.
Fuller D. Baird
Paul L. Day, Ph.D.
Conrad A. Elvehjem, Ph.D.
Carl R. Fellers, Ph.D.
William E. Krauss, Ph.D.
Elmer M. Nelson, Ph.D.
Walter C. Russell, Ph.D.

Committee on Membership and Fellowship (unallocated)
Abraham Lichterman, Phar.D., *Chairman,* Department of Health, New York, N. Y.
Philip K. Bates, Ph.D.
Antonio Bolduc, M.D.
James R. Esty, Ph.D.
Robert F. Huntley

F. A. Korff
Rachel L. Reed
Ole Salthe
Harry W. von Loesecke
William R. M. Wharton

Committee on Nutritional Problems (allocated to Committee on Research and Standards)

Walter H. Eddy, Ph.D., *Chairman*, Teachers College, Columbia University, New York, N. Y.
P. C. Jeans, M.D.
D. Breese Jones, Ph.D.
Charles G. King, Ph.D.
Ira A. Manville, M.D., Ph.D.
E. V. McCollum, Ph.D.
Roe E. Remington, Ph.D.
William H. Sebrell, Jr., M.D.
Nina Simmonds, Sc.D.
James A. Tobey, Dr.P.H.

Joint Committee on Analyzing Frozen Desserts (Joint with the Committee of the Laboratory Section) (allocated to the Committee on Research and Standards)

Frederick W. Fabian, Ph.D., *Chairman*, Michigan State College, East Lansing, Mich.
Milton E. Parker
J. H. Shrader, Ph.D.

Associate Referees

P. A. Downs, Ph.D.
H. H. Hall
Paul S. Prickett, Ph.D.
Martin J. Prucha, Ph.D.
Roy Schneiter

Maternal and Child Health Section

Committee on Dentistry (unallocated)

Guy S. Millberry, D.D.S., *Chairman*, University of California, San Francisco, Calif.
M. Luise Diez, M.D.
Lon W. Morrey, D.D.S.

Committee on School Health Service (unallocated)

Charles C. Wilson, M.D., *Chairman*, 249 High Street, Hartford, Conn.
Mary Ella Chayer, R.N.
Harold H. Mitchell, M.D.

Committee on Scientific Exhibits (unallocated)

J. Warren Bell, M.D., Ph.D., *Chairman*, National Society for Prevention of Blindness, 50 West 50th Street, New York, N. Y.
Harry J. Benz, M.D.
Albert McCown, M.D.

Joint Committee on Coördination of Activities (Joint with American School Health Association) (unallocated)

Walter H. Brown, M.D., *Chairman*, Stanford University, Palo Alto, Calif.
Ruth E. Boynton, M.D.
J. T. Phair, M.B., D.P.H.

Joint Committee on Coördination of Activities (Joint with the Public Health Education Section) (unallocated)

Martha M. Eliot, M.D., *Chairman*, U. S. Children's Bureau, Washington, D. C.
Jessie M. Bierman, M.D.
Richard A. Bolt, M.D., Dr.P.H.
James F. Rogers, M.D., Dr.P.H.
Estella F. Warner, M.D.

Public Health Nursing Section

Committee to Study Relationships Between Official and Nonofficial Public Health Nursing Agencies (unallocated)

Julia L. Groscop, R.N., *Chairman*, 311 S. Juniper Street, Philadelphia, Pa.
Gladys A. Adams, R.N.
Ethel G. Brooks, R.N.
Mary C. Connor, R.N.
Laura A. Draper, R.N.
Amelia Grant, R.N.
Ruth W. Hay, R.N.
Kathryn C. Trent, R.N.
Abbie R. Weaver, R.N.

Committee to Define Public Health Nursing Problems Needing Research and Study (unallocated)

Margaret G. Arnstein, R.N., *Chairman*, University of Minnesota, Minneapolis, Minn.
Helen Bean, R.N.
Dorothy J. Carter, R.N.
Hortense H. Cikovsky, R.N.
Elizabeth G. Fox, R.N.
Ann M. Hellner, R.N.
Mary B. Hulsizer, R.N.
Marian G. Randall, R.N.

Public Health Education Section

Committee on Community Organization for Health Education (Joint with the Health Officers Section) (unallocated)

Clair E. Turner, Dr.P.H., *Chairman,* Massachusetts Institute of Technology, Cambridge, Mass.
J. Rosslyn Earp, Dr.P.H.
Ira V. Hiscock, Sc.D.
J. J. Sippy, M.D.
Henry F. Vaughan, Dr.P.H.
Harold H. Walker, C.P.H., Ph.D.

Consultants

J. M. Bierman, M.D.
M. Derryberry, Ph.D.
Frank W. Hubbard
D. Oberteuffer, Ph.D.
J. F. Rogers, M.D.

Committee to Study the Work of the Section (unallocated)

David B. Treat, *Chairman,* Department of Health, Flint, Mich.
Ruth E. Grout, Ph.D., C.P.H.
Muriel F. Bliss, C.P.H.

Committee for the Study of State Administration of Health Education (unallocated)

Burt R. Rickards, *Chairman,* State Department of Health, Albany, N. Y.
Marjorie Delavan
Reba F. Harris, *Secretary*
Jean V. Latimer
Elizabeth C. Nickerson, C.P.H.

Committee on School Health Policies (unallocated)

William P. Shepard, M.D., *Chairman,* 600 Stockton Street, San Francisco, Calif.
Isabelle F. Borden, M.D.
Vivian Drenckhahn, C.P.H.
Edna A. Gerken, C.P.H.
Clair E. Turner, Dr.P.H.
Charles C. Wilson, M.D.
J. M. Wisan, D.D.S.

Committee on Coördination of Activities (Joint with the Maternal and Child Health Section and the American School Health Association) (unallocated)

Carl A. Wilzbach, M.D., *Chairman,* Commissioner of Health, Cincinnati, O.
Sally Lucas Jean

Epidemiology Section

Committee on Bathing Places (to coöperate with the Committee on Bathing Places of the Engineering Section)

Lloyd Arnold, M.D.

Committee on Waterways Pollution (to coöperate with the Committee on Waterways Pollution of the Engineering Section)

Milton V. Veldee, M.D.

Resolutions

THE following Resolutions were unanimously adopted by the Association at the Sixty-eighth Annual Meeting in Pittsburgh, Pa., October 17, 1939:

1. Appreciation to Coöperating Agencies

Resolved that the American Public Health Association expresses its thanks to the Pittsburgh Department of Health and the other City Departments and to the numerous organizations in and around Pittsburgh which have contributed so generously to the multiple activities incident to the Annual Meeting.

2. Thanks to Hotels

Resolved that the American Public Health Association expresses its appreciation to the Hotel William Penn, the Hotel Roosevelt, and the Hotel Fort Pitt for their valuable assistance in the conduct of the Sixty-eighth Annual Meeting.

3. Appreciation to Exhibitors

Resolved that the American Public Health Association expresses its grateful appreciation to its friends and coöperators who have presented at its Sixty-eighth Annual Meeting such excellent exhibits, both scientific and technical, and which are of such great interest and value to the public health profession.

4. Thanks to the Press

Resolved that the American Public Health Association acknowledges its indebtedness to the press, national, state and local, for its excellent service in connection with the Sixty-eighth Annual Meeting.

5. Peace—An Essential for Public Health Progress

The American Public Health Association, assembled for its Sixty-eighth Annual Meeting, notes with distress the absence of many Canadian members—absent because their country is at war.

For the first time in many years, the Annual Meeting takes place without the participation of distinguished visitors from overseas. We record our deep regret that the war has necessitated the cancellation of a special scientific session planned for them.

Our hearts reach out to our colleagues in countries where war and preparations for war go forward. We know with what heaviness of spirit they must view undertakings utterly disconsonant with the stately purposes of our profession—to save and to extend human life.

The aims and aspirations of public health workers throughout the world can be attained best when the world is at peace. Therefore, peace becomes a necessity for our profession and the return of peace and its preservation a major objective.

We who earnestly seek to eradicate recurring pestilence would now solemnly dedicate ourselves just as aggressively to the abolition of mankind's most devastating plague—War.

6. In Memoriam

Resolved that it is with a sense of irreparable loss that the American Public Health Association records the

death since its last Annual Meeting of the following Fellows and members:

Grace Abbott, Chicago, Ill., Elected Member 1929

V. H. Bassett, M.D., Savannah, Ga., Elected Member 1912, Elected Fellow 1923

Henry C. Becker, M.D.V., Chicago, Ill., Elected Member 1927

Joseph T. Brennan, M.D., Independence, Mo., Elected Member 1935

Maurice Brodie, M.D., Detroit, Mich., Elected Member 1932, Elected Fellow 1934

Pearson D. Brooker, D.D.S., Columbia, S. C., Elected Member 1938

J. Treichler Butz, M.D., D.D.S., Allentown, Pa., Elected Member 1918, Elected Fellow 1922, Elected Life Member 1934

Joseph S. Caceres, Hilo, Hawaii, Elected Member 1930

P. P. Causey, M.D., Courtland, Va., Elected Member 1932

Clifford Charlock, Hilo, Hawaii, Elected Member 1920, Elected Fellow 1924

W. J. V. Deacon, M.D., East Lansing, Mich., Elected Member 1912, Elected Fellow 1922

Hoyt E. Dearholt, M.D., Milwaukee, Wisc., Elected Member 1910, Elected Fellow 1923

Ernest C. Dickson, M.D., San Francisco, Calif., Elected Member 1920, Elected Fellow 1934

William H. Doolittle, Bethlehem, Conn., Elected Member 1929

C. A. Earle, M.D., Desplaines, Ill., Elected Member 1920

Martha O. Eckford, Sc.D., Columbus, Miss., Elected Member 1930

Frederick L. Fenno, M.D., New Orleans, La., Elected Member 1927

H. E. Ferguson, M.D., Toronto, Ontario, Canada, Elected Member 1923

A. H. Flickwir, M.D., Fort Worth, Texas, Elected Member 1921, Elected Fellow 1923

Louis H. Fligman, M.D., Helena, Mont., Elected Member 1935

Thomas M. Fly, M.D., Little Rock, Ark., Elected Member 1936

Leo H. Flynn, M.D., Eau Claire, Wisc., Elected Member 1930

Alfred Friedlander, M.D., Cincinnati, Ohio, Elected Member 1926

Robert L. Frisbie, M.D., Rhinelander, Wisc., Elected Member 1937

Stephen De M. Gage, Providence, R. I., Elected Member 1901, Elected Fellow 1922

Dr. Joseph E. Germain, D.P.H., Rimouski, P.Q., Canada, Elected Member 1931

McLeod Gillies, M.D., Charleston, W. Va., Elected Member 1935

Herman S. Gove, M.D., Jefferson City, Mo., Elected Member 1934

Wesley M. Graff, New York, N. Y., Elected Member 1936

Drew R. Handley, M.D., Edinburg, Texas, Elected Member 1931

Clarence D. Hart, M.D., Savannah, Ga., Elected Member 1918, Elected Fellow 1923

Leigh I. Holdredge, Oneonta, N. Y., Elected Member 1937

Lucius W. Holloman, M.D., Marksville, La., Elected Member 1936

Charles C. Hopkins, C.E., Rochester, N. Y., Elected Member 1926

Edward J. Howland, M.D., Colchester, Conn., Elected Member 1933

William C. Hunsicker, M.D., Philadelphia, Pa., Elected Member 1938

Roy R. Jones, M.D., Washington, D. C., Elected Member 1935

Wendell A. Jones, M.D., Riverside, Calif., Elected Member 1935

Frank W. Laidlaw, M.D., Middletown, N. Y., Elected Member 1927, Elected Fellow 1930

Alfred Larson, M.D., Ph.D., Youngstown, Ohio, Elected Member 1912

Daniel S. Latham, M.D., Auburn, R. I., Elected Member 1926

Samuel T. Lindsay, M.D., Rochester, N. Y., Elected Member 1934

Jacob G. Lipman, Ph.D., New Brunswick, N. J., Elected Member 1915, Elected Fellow 1923

William F. Lunsford, M.D., Kansas City, Kansas, Elected Member 1934

Lloyd A. Masterson, M.D., New Orleans, La., Elected Member 1936

Charles H. Mayo, M.D., Mayo Clinic, Rochester, Minn., Elected Member 1928

Earl B. McKinley, M.D., Washington, D. C., Elected Member 1935

Wilbur A. McPhaul, M.D., Jacksonville, Fla., Elected Member 1936

James J. Minot, M.D., Boston, Mass., Elected Member 1920

Edward V. Murphy, M.D., Newport, R. I., Elected Member 1926

Gustave A. Ootman, M.D., Kelowna, B. C., Canada, Elected Member 1935

Joseph C. Palmer, M.D., Syracuse, N. Y., Elected Member 1936

William H. Park, M.D., New York, N. Y., Elected Member 1912, Elected Fellow 1923
Zula L. Powell, R.N., Fort Worth, Texas, Elected Member 1928
John Ritchie, Malden, Mass., Elected Member 1912
Robert C. Robertson, Delhi, N. Y., Elected Member 1937
Evart G. Routzahn, New York, N. Y., Elected Member 1912, Elected Fellow 1923
Joseph C. Saile, M.D., Bloomfield, N. J., Elected Member 1920
William H. Seemann, M.D., New Orleans, La., Elected Member 1933
A. C. Shamblin, M.D., Cartersville, Ga., Elected Member 1930
Harry A. Simrell, M.D., Stockton, Mo., Elected Member 1938
Walter S. Stanley, San Antonio, Texas, Elected Member 1937
Thomas J. Stanton, Wichita, Kansas, Elected Member 1930
Walter S. Stevens, M.D., Oklahoma City, Okla., Elected Member 1937
Charlotte A. Stickney, M.D., St. Paul, Minn., Elected Member 1938
Lucy P. Sutton, M.D., New York, N. Y., Elected Member 1936
William A. Taltavall, M.D., Redlands, Calif., Elected Member 1919
William R. Tracey, Ottawa, Ont., Canada, Elected Member 1935, Elected Fellow 1937
F. E. Trotter, M.D., Honolulu, Hawaii, Elected Member 1924
Grace Van Doorn, B.A., Milwaukee, Wisc., Elected Member 1926
Fred Wasserman, Ancon, Canal Zone, Elected Member 1936
Morris S. Wiener, D.D.S., Brooklyn, N. Y., Elected Member 1938
Adele E. Yoe, Louisville, Ky., Elected Member 1937

7. The Conservation of Health Essential to the Security and Progress of a Nation

The American Public Health Association believes that the health of the people is a matter of public concern. The Association reiterates its conviction that conservation of health is essential to the security and progress of a nation. We call attention to the declaration of principles, dated December 19, 1938, and already passed by the Governing Council. We rededicate ourselves to renewed efforts to translate these principles into effective action.

8. Industrial Hygiene Services

WHEREAS the protection of the health of approximately 50,000,000 gainfully employed workers in the United States is an obligation of industry and of official public health agencies, whether their health be affected by conditions of their working environment or affected by other conditions, and

WHEREAS the protection of the health of the working population, including occupational disease control, is being undertaken by a majority of state departments of health and by the United States Public Health Service, and

WHEREAS it is recognized that establishment or extension of health services for the gainfully employed workers is urgently needed in many areas, therefore be it

RESOLVED, that in accordance with its previously declared principles, the American Public Health Association urges that any expansion of tax-supported industrial hygiene services be developed in a manner to provide immediate or ultimate responsibility for direction of the programs by the state departments of health.

9. Maternal, Infancy and Child Health Services

WHEREAS health services for maternity, infancy, preschool, and school children are properly a part of the general health program of state and local health departments and should be integrated with all other activities of these departments and participated in by medical and allied professions, and

WHEREAS the development of the program of health instruction and physical education is properly a function of departments of education, and

WHEREAS in order to be effective, all these services should be coördinated, and

WHEREAS existing legislation already provides for health and medical services for children of all ages and for coördinated action between state departments of health and departments of education, welfare and other agencies, therefore be it

RESOLVED that the American Public Health Association, approving the promotion of health by schools through health instruction, urges that any expansion through increased federal appropriation which includes health and medical services to children be developed through agencies whose primary concern is with health services.

10. APPRECIATION TO DR. MAZŸCK P. RAVENEL

The Governing Council notes with gratification the completion of fifteen years of distinguished service as Editor of the *American Journal of Public Health* by Dr. Mazÿck P. Ravenel. The Council on behalf of the Association congratulates Dr. Ravenel and acknowledges a debt of gratitude for his devotion and his intelligence.

(This resolution was adopted by a rising vote.)

Report of the Executive Board to the Governing Council*

A REVIEW of the activities of a professional society for one year, such as that prescribed by the By-laws of the American Public Health Association, tends by the nature of the elements involved either toward overemphasis of routine matters or oversimplification of the forces working without regard to an arbitrary calendar. It is my intention, in so far as possible, to avoid both these defects in making this report on the high lights of the year 1938–1939 to the Governing Council on behalf of the Executive Board.

Association progress over a twelve month period is calculable for those things which can be reduced to statistics, such as membership growth, business activities, and income, and that record will stand, unaffected by historical opinion. General effectiveness, however, and the influence and value of work accomplished, are incapable of measurement and difficult of evaluation in terms that will sustain critical analysis in the years to come.

In public health comparisons from one year to another are usually without drama. Twenty-five years, however—and international events have turned our thoughts back that far—offer a sufficient sweep of time for comparative purposes. Drama there has been in plenty in the last 25 years in the public health profession and in the Association. Contrasting our situation in 1914 when the Association held its 42nd Annual Meeting in Jacksonville, Fla., with our situation today, there is evidence for the most cynical that we have come a long way, not only in the things that can be reduced to statistics but also in our philosophy. It is our hope that 25 years hence public health horizons may extend as far beyond ours as ours do beyond those of the most visionary 25 years ago.

In 1914, even as profound an event as the World War then under way made no apparent impression on the Association for many months, doubtless because the organization was related to vital events in a far less dynamic way than at present.

The 1914 membership roll was 1,125, or 17 per cent of what it is today. The *American Journal of Public Health*, then in its third volume, and the Annual Meeting, constituted the main activities of the Association, with but a modest degree of continuity in Association affairs between. There were several of the original founders still alive who brought with them an outlook and a content quite different from that today. Environmental sanitation was the predominating interest, though advances in bacteriology and serology and in systematic administration were making themselves felt. The Sections were four in number—Laboratory, Vital Statistics, Sociology, and Health Officers. Though there were some preliminary forecasts, the contributions from epidemiology, engineering, nutrition, child hygiene, public health education, and public health nursing were *still undeveloped*. Industrial hygiene was just emerging as a public health specialty and we observe that the Section is celebrating its

* Presented in Pittsburgh, Pa., October 16, 1939.

twenty-fifth anniversary at the Pittsburgh Annual Meeting. All medical features of our modern health program were relatively inconspicuous. The leadership came from the engineer, the laboratory worker, the sociologist, and a few far-sighted health officers.

The standard publications, which now represent an important service from the Association, were almost lacking, though one edition of *Standard Methods of Milk Analysis* had made its appearance and two editions of *Standard Methods of Water Analysis.* The more comprehensive volumes today so well known were still to be written. There was no *Appraisal Form for Local Health Work,* no definitive report on the *Control of Communicable Disease,* no *Year Book* with its wealth of reference material, no volumes like those on *Community Health Organization* based on exhaustive Association studies. There was no report on swimming pool sanitation, on lead poisoning, on occupational disease legislation. There were none on popular methods of health education. There were no Committees on Administrative Practice, on Professional Education, on Research and Standards.

The influence of the Foundations, which has since so profoundly affected public health, was not felt in 1914. The Health and Welfare Department of the Metropolitan Life Insurance Company was 3 years old—its power still lay in the future. There was but one young school of public health. There were few departments of preventive medicine in medical schools. Federal funds in adequate amounts for expansion of public health services were hardly dreamed of.

We have in the Association the machinery, the spirit, the will, and the professional resources to go forward more surely and rapidly to greater heights in the next 25 years. Let us review our strengths in the fall of 1939, refer to work begun or continued in the past year, and intimate some possibilities for future usefulness.

We have mentioned the increase in membership in 25 years. On this point the most striking increase has taken place in the last 5 years, as the following table demonstrates:

September 1	*Fellows*	*Members*	*Total*	*Life Members*	*Journal Circulation*
1934	890	3,399	4,289	88	5,126
1939	1,079	5,507	6,586	157	7,780

The present policy of a full-time Executive Secretary dates back 5 years and this expansion would seem to coincide with and justify the provision of full-time leadership with centralized administration.

There is an extraordinary amount of volunteer service readily available to this professional society. One might measure this service in terms of the work of our 10 Sections to which the central office looks, not only for the scientific content of the Annual Meeting, but for committee activities covering a wide range of interests. Or one might measure it in terms of the work of the 4 standing committees, three of which have active study programs under way, providing channels for the best professional advice and guidance.

The program of the Committee on Administrative Practice is well known. It is projected through numerous subcommittees and is reflected in services to many health departments. Space limitations forbid mention of all the subcommittees consolidated in its broad platform, but the character of the studies conducted under the Subcommittee on the Evaluation of Administrative Practice is so unique as to warrant reference. The membership will be familiar with studies of ad-

ministrative and laboratory procedures which have emanated from many Association groups. It is unusual, however, for the Association to have conducted laboratory controlled experiments on the effectiveness of various administrative procedures, notably those which attempt to set up active immunity against whooping cough, diphtheria, and measles. Especially worthy of note is the high quality of contribution which has resulted from the coöperation of several universities and a number of state and city departments of health in this program. It is also significant that the long-standing interest of the Committee on Administrative Practice in methods of appraising health administration has resulted in representation of this experience in the councils of the Health Section of the League of Nations. A committee report by the League on a simplified appraisal form has just been published. The American contribution to this study has been extensive.

Somewhat less known but of great weight and distinction is the work of the Committee on Research and Standards to which scores of other Association committees are allocated. The work of its Subcommittee on Accuracy of Certified Causes of Death, for example, has been especially valuable during the past year and has included a decennial revision conference in Paris. Outstanding also is the aggressive study on the hygienic aspects of housing made by a special committee for this purpose under the aegis of the Committee on Research and Standards.

The Committee on Professional Education has made important progress in drafting statements of qualifications proposed for public health personnel of various grades. We pass rapidly over the achievements of this and other standing committees because each chairman will report more fully to the Governing Council at Pittsburgh.

In listing resources of voluntary services it must be noted that the Association Nominating Committee has systematically canvassed all aspects of the representation on the Governing Council and has presented a list of nominees selected with due regard to special interests and geography. Then there are the Program Committee, the Committee on Constitution and By-laws, the Committee on Scientific Exhibits, the Editorial Board, and other specialized groups which continuously enrich and strengthen the Association, technically and organizationally. Important as is the performance of our paid executive staff, the voluntary contributions to the A.P.H.A. really make it the influential service organization it is, and it is appropriate that I should congratulate those who have given service, whether members of the Governing Council, the Executive Board, the sectional committees, the standing committees, or in some other capacity. Our theory of administration is to provide good environment, suitable encouragement, and then stay out of the way of those selected and qualified to make these contributions to science and human welfare.

The past year has been one increasingly vital in the relationships of public health and medical care to a national health program in the United States. The enlarged committee authorized to confer with the Interdepartmental Committee to Coördinate Health and Welfare Activities and Other Agencies, under the Chairmanship of President Wolman, has reported to the Governing Council, and the Council has approved —all but unanimously—a statement of principles based on this declaration. President Wolman has appeared by request before the United States Senate Committee on Education and Labor and has interpreted these principles as they relate to legislative problems. It is believed appropriate that the Associa-

tion should serve in this capacity rather than as an advocate of a particular item of legislation, inasmuch as there are wide differences of opinion as to method represented in the Association membership, although agreement in principle is surprisingly unanimous.

The Association Committee on American Museum of Hygiene makes its best report in 1939 in terms of the substantial and compelling Building on Medicine and Public Health at the New York World's Fair and the incorporation of the American Museum of Health with its long range possibilities beyond the duration of the Fair. Both of these activities have burgeoned under the stimulus of the Association Committee. Doubtless the Chairman of the Committee on American Museum of Hygiene will present a full and adequate report, but this summary of the year's high lights would be seriously lacking if it did not contain a congratulatory comment on these achievements. The Association itself has joined with scores of other agencies in sponsoring various exhibits in the Building on Medicine and Public Health, which has attracted a disproportionately large attendance now well into the millions, with a resulting effect on public health education which may not readily be minimized.

A listing of professional resources must include the two Branches of the Association and the affiliated state societies. This year has marked the tenth anniversary of the establishment of the Western Branch, and the report of Branch activities submitted by Dr. William P. Shepard, Secretary for the entire period of ten years, reveals the inclusive nature of the Branch interests and organization. The Western Branch Annual Meeting was a testimonial to the leadership of Dr. Shepard, and on his retirement from active responsibility in this post he leaves a vigorous organization in the hands of his successor, W. Ford Higby, who is well equipped to carry on.

The eighth annual meeting of the Southern Branch of the Association will be held in November, in conjunction as usual with the meeting of the Southern Medical Association — this year at Memphis, Tenn. At each of the Branch meetings Association officers have been present. It has been and will be the Association policy so far as possible to have representation from the parent Association at Branch meetings, affiliated society meetings, and, through the courtesy of a special invitation, at the meetings of the Canadian Public Health Association.

At the last Annual Meeting, public health associations in Colorado, Arizona, and Utah were elected to membership in the Association, making a total of 18 state societies so affiliated. During the year it has been possible to cultivate relationships with the new societies as well as with the old. It is expected that applications will be received from state societies in Montana and Idaho for consideration at the Pittsburgh Annual Meeting. The office has assisted these societies in complying with the constitutional requirements but has been consistent in its policy of leaving in local hands the initiative for affiliation with the parent organization.

As a service organization, the Association has seen opportunities for providing an exchange between prospective employers and employees, and increased activity in this field has been apparent for several years. The past twelve months have not been notable for the number of new positions available, but at such a time the Employment Service has emphasized quality and has brought together qualified applicants and appointing officers to a gratifying degree. The Association does not recommend any candidate for a position, but both through the Service itself and through

the page carried each month in the *American Journal of Public Health* it has rendered a much appreciated service not only to its members but to a wider group of persons trained and experienced in public health. Two hundred thirty-two applicants for positions have been registered during the year and information regarding one hundred fifty-one openings has been made available.

The American Public Health Association was formerly a sponsor of the Joint Vocational Service and its nurse placement activities. With the discontinuation of these activities, the Association has withdrawn from the J.V.S. during the past year and notes with approval the high standard of professional placement service available through the Nurse Placement Service in Chicago and the Nursing Bureau of Manhattan and the Bronx. It does not seem feasible for the Association Employment Service to register public health nurses. This is a highly specialized service which should be personally administered by a public health nurse.

The year marks an advance in the quality of the Association's official publication, the *American Journal of Public Health.* The volume now being completed represents a better correlation than has been possible before between the Annual Meeting and the *Journal,* particularly as a result of the further centralization of the responsibility of the executive office. Twelve issues of the *Journal* have been published since the very successful Annual Meeting at Kansas City which have brought the important papers presented there to a much larger group than the 2,324 who were actually in attendance, as well as a variety of contributed articles. The 1938–1939 volume contains 1,684 pages and has been circulated to nearly 8,000. Appreciation is extended to the editor, Dr. M. P. Ravenel, to whom must be credited a considerable share of the growing repute in which the *Journal* is held, both on this continent and abroad, and who is now rounding out his fifteenth year in this capacity.

Other publications of the Association include the annual *Year Book,* which has become an institution, the volume this year being the ninth, and a fourth printing of *Standard Methods of Water Analysis,* eighth edition, now under way. The latter continues to be edited and printed in collaboration with the American Water Works Association and under the editorship of Dr. John F. Norton with a committee of able experts.

Important in the minds of many of those dealing with the control of milk is a new edition of *Standard Methods of Milk Analysis,* now entitled "Standard Methods for the Examination of Dairy Products." This edition, the seventh, which was approved in due course by the Committee on Research and Standards and the Governing Council, sustains and surpasses the long and distinguished record of previous editions, begun in 1910. It marks the first occasion in which the Methods have been extended to cover dairy products in general and contains one of the few relatively complete sources of information on the phosphatase test, among other up-to-date methods for protecting these basic foods. As in previous editions, the Association of Official Agricultural Chemists has been the collaborator on chemical methods. It would be inconsiderate not to mention at this point the long and devoted service of the Chairman of the Standard Methods Committee on the Examination of Dairy Products, Dr. Robert S. Breed, and the assistance of his expert associates.

It will be remembered that the Committee on the Hygiene of Housing some months ago published *The Basic Principles of Healthful Housing.* It is gratifying to report that the circulation of

this document has been encouragingly wide and the influence on housing projects unmistakable. During the year, these principles have been revised and reprinted in a form which is being distributed at the committee's exhibit in the Medicine and Public Health Building at the New York World's Fair. They have never been presented for adoption as standards by the Association but it is believed that they are approaching a degree of unanimity and acceptance which soon will warrant their consideration as such. Meantime the committee is continuing its observation on construction, ventilation, heating, noise, safety, and other aspects of these studies which make a natural and spontaneous appeal to the public. While the committee had expected the response of architects, designers, builders, and housing authorities to the report and was prepared to meet it, they had not anticipated the prompt public interest, which impresses them now as a rich field for cultivation and is the natural direction for future action.

A new publication, which will be released to the office for printing within the next few months, is entitled "Diagnostic Procedures and Reagents." The collection of manuscripts which will make up this volume has occupied the chairman of the committee of the same name, Dr. W. D. Stovall, and the Editor, Lt. Col. A. Parker Hitchens, during the better part of two years. It is fully expected that the influence of this new volume in its field will be comparable to the far-reaching influence of *Standard Methods of Water Analysis* and of *Milk Analysis* in their respective fields. The new book will be distributed through the Book Service as are all other Association publications and publications of outside publishers. The membership turns more and more to the Book Service for advice and guidance in its selection of public health literature. The Eighteenth Edition of the A.P.H.A. *Bibliography of Public Health Books* will be distributed at the Pittsburgh meeting.

Many additional matters of import in committee, central office, and Executive Board activity could be enumerated. Sooner or later all are translated into service to the membership or into Association policy by Governing Council pronouncement. In their interim status they are incorporated in the deliberations of the Executive Board. The minutes of the meetings of the Board since October, 1938, hold the seeds of many such.

The Association approaches the end of the calendar year with the consciousness of having made progress. It has dealt with perhaps a larger body of work than ever before but has managed to keep its expenditures within its income. There is nothing in the Association structure, philosophy, program, plan, or present situation that would appear to endanger its possibilities for continuing growth and usefulness. We confidently anticipate both.

JOHN A. FERRELL, M.D.
Chairman, Executive Board
J. N. BAKER, M.D.
WALTER H. BROWN, M.D.
LOUIS I. DUBLIN, PH.D.
EDWARD S. GODFREY, JR., M.D.
JOHN P. KOEHLER, M.D.
FRIEND LEE MICKLE, SC.D.
THOMAS PARRAN, M.D.
ABEL WOLMAN, DR.ENG.

REPORTS OF COMMITTEES

THE By-laws of the American Public Health Association provide that no standards shall be promulgated as the official and authorized judgment of the Association except with the approval of the Governing Council. Except where specifically noted to the contrary, the following reports are in the nature of progress reports from committees, most of which have had Section approval, but which have not been presented for Governing Council action, and therefore are not to be interpreted as standards approved by the American Public Health Association.

American Museum of Hygiene*

Association Committee

FOR the first time in the history of this committee it is necessary to record the loss of one of its members. Evart G. Routzahn, a distinguished member of the Association, was a "charter" member of the committee, and until his death gave it generous devotion and the benefit of his insight, judgment, and broad experience. It is of special regret to the committee that he did not live to see the exhibits on medicine and public health at the New York World's Fair, which so well express his pioneer concept of the dramatic effectiveness of the visual method in health education.

The exhibit has had over 7 million visitors. This exceeds by some 50 per cent the earlier attendance record for a medicine and public health exhibit which was at Düsseldorf in 1911. The New York exhibit covers some 30,000 square feet of floor space, and represents an investment from all sources of approximately 1½ million dollars.

The extraordinary success of this exhibit promises well for the future of the American Museum of Health, which has developed from it. We reported last year on the establishment of this Museum in New York. It is now organized, staffed, and financed, thanks to the opportunity which the New York World's Fair put into its hands. Copies of the first annual report of this Museum are available to those who are especially interested.

As its first important accession, this Museum has received from the Oberlaender Trust the exhibits from Dresden referred to in previous reports, which were selected by the secretary of this committee in collaboration with Dr. Haven Emerson, representing the Oberlaender Trust. In addition, the Museum has built a number of new exhibits out of funds donated to it by eight leading life insurance companies. This Museum is also the contractual legatee of most of the other exhibits in the Medicine and Public Health Building at the New York World's Fair, which were sponsored by various organizations.

Exercises dedicating the new Museum were held on June 17, 1939. At these exercises Mayor La Guardia promised that he would aid in finding a permanent home for the Museum in New York City.

The basic operating expense of the Museum has been met through a grant from the Carnegie Corporation of New York. This grant has also enabled the Museum to undertake a research study on visitor reaction.

The American Museum of Health has from its own funds supplemented the moneys made available by the American Public Health Association and a number of its members for an exhibit

* Eighth Annual Report presented to the Governing Council.

on "Your Health Department and Your Family," in the Medicine and Public Health Building.

Your committee is happy to report that the Cleveland Museum of Health and Hygiene is also making progress. It has issued a modest prospectus and has been concentrating its efforts in obtaining sufficient funds to guarantee continuous operation. Its membership is growing, and it has been pledged a permanent building. The secretary of that Museum, Howard Green, states: "Before winter I feel confident that we shall have sufficient backing to make it possible to think about a definite date of opening."

Interest in a California museum continues on the West Coast under the leadership of the Western Branch of the American Public Health Association. Concerning this development, Dr. Millberry reports as follows:

> On July 22, 1939, a meeting of the Committee on Health Education and Museum, of the Western Branch, American Public Health Association, was held in the Palace Hotel, San Francisco, at which a number of leaders in public health, medicine, and related fields were guests, Mr. Calver being among the number.
>
> The interest shown in this movement in the West, stimulated markedly by Mr. Calver's report of achievements in New York, indicated that it will go forward rapidly now.
>
> Some requests have been made of the Golden Gate International Exposition exhibitors for material that would be desirable in a Public Health Museum. Other requests are now being made to others. The committee will meet on October 10 to continue its effort to secure exhibits and obtain public support.

In addition to the establishment of separate museums of health and hygiene, there has also developed during the life of this committee an increasing interest in health exhibits on the part of other museums. The science museums in Chicago, Buffalo, Philadelphia, and New York all now have exhibits relating to health. The health exhibits in the New York Museum of Science and Industry are for the most part copies of the Dresden exhibits which it made while it had those exhibits on loan from the Oberlaender Trust and the American Museum of Health.

Recognizing the growing interest of both museum people and health educators in health museums and in health exhibits in other types of museums, this committee arranged a conference on Museum Health Exhibits to be held here this week in connection with the Association's Annual Meeting.

Although the committee feels that there is much to be learned about the technic for effectively operating a health museum, and that there is an immense field for further exploration, it is gratified that the idea to which it was dedicated by the Association has taken firm root. Two important publications which have appeared in the past year record this development. *Educating for Health*, published by the American Association for Adult Education, refers to the Museum of Health as part of the accepted machinery of adult education in America. Similar recognition is given to the health museum in a critical and exhaustive study, *The Museum in America*, recently published by the American Association of Museums.

The Association can well be proud of the part it has taken in developing a new instrument for social welfare. To maintain its contact with this development, your committee recommends that it be continued.

LOUIS I. DUBLIN, *Chairman*
BERTRAND BROWN
KENDALL EMERSON
VICTOR G. HEISER
SALLY LUCAS JEAN
GUY S. MILLBERRY
C.-E. A. WINSLOW
HOMER N. CALVER, *Secretary*

Housing Codes*†

FROM very early times it has been found necessary to impose regulations concerning the construction and maintenance of dwellings in the interest of safety and health. Hazards of fire and of collapse have received most attention, although sanitary regulations have not been altogether neglected. Requirements concerning thatched roofs and bearing walls are familiar to students of the subject, and health requirements also appear here and there. For instance, Fitz-Elwyne's Assize of Buildings, an English act passed in the time of King Richard I, has this to say:

> Also, concerning necessary-chambers in the houses of citizens, it is enacted and ordained, that if the pit made in such chamber be lined with stone, the mouth of said pit shall be distant two and one-half feet from the land of the neighbour, even though they may have a common stone wall between them. But if it shall not be lined with stone, it ought to be distant three and a half feet from the neighbour's land.

Many of the early regulations concerning dwellings in this country appeared in scattered legislation which was passed as the need for it became apparent and as a social conscience developed. Congestion of population in urban centers brought about conditions that required some solution. Conditions in the tenements of New York City were among the worst, and so it was natural that legislation should take the form of so-called " tenement-house laws," of which there was a long succession starting in 1867. These tended to set the pattern for laws in other cities, although the conditions to which they applied might be very different.

Most famous of the line of tenement-house laws in New York was that of 1901. Like all tenement-house laws, it stopped short of regulating one-family and two-family dwellings. It dealt with protection from fire, including exit facilities; light and ventilation, including size of light courts and yards; sanitary provisions, including water-closet accommodations, cellar and basement occupancy, and overcrowding; " remedies," including requirements for building permits, registration of owners, and administrative details. This act remained without a major overhauling until the Multiple Dwellings Law took its place in 1929. The latter, which covers the same ground, although in a much more complicated and obtuse fashion, is now becoming encrusted with amendments like its predecessor.

It should be noted that the law for New York City was passed as a state matter. Other states passed similar laws, including Pennsylvania (1895), New Jersey (1904), Connecticut (1905), Wisconsin (1905), Indiana (1909), California (1909), Kentucky (1910), Massachusetts (1913), Michigan (1917), and Iowa (1919). Some of these acts were later modified or repealed.

The inspiration and pattern for most of the legislation passed subsequent to 1914 was the Model Housing Law published by Lawrence Veiller in that year. This proposed law, unlike some of the state laws just cited, was a state law mandatory upon cities and towns within the state. It covered all kinds of dwellings, including single- and two-family

* Report of the Sub-committee on Codes of the Sub-committee on the Hygiene of Housing.
† Prepared by George N. Thompson.

dwellings, thus differing from the earlier tenement-house acts.

Since this proposed law was widely consulted in the preparation of legislation, its contents reflect the general scope of subjects covered in housing laws.

After a brief flare-up of legislation following the Veiller pattern, there was an almost complete cessation of housing laws which has continued to the present day. This was partly because of the rise of the idea of zoning, which captured the imaginations of those interested in housing, and was felt to be the answer to many of the problems covered in housing laws. Promotion of zoning so absorbed the attention of housing experts that little else was done. Zoning, however, dealt with only one feature of housing legislation—that of light and ventilation—and then only from the outside of the dwelling. After the battle over zoning was won, there was a period of complacence and congratulation, followed more recently by a realization that perhaps other features of housing legislation have been too much neglected.

Coexistent with the rather limited amount of housing legislation has been a great mass of legislation involving health departments, plumbing departments, building departments, police departments, and other agencies to which have been assigned various functions having to do with safety and health. The nonexistence of coördinated housing legislation, therefore, should not be taken as an indication that no interest has been shown in the problem, but only that it has been left to the normal activities of various bodies acting within their designated fields. In fact, one objection to the introduction of housing legislation has been that it trespasses upon already established and presumably efficient existing agencies.

This brings us to the question of whether a housing code should be advocated or whether attention should be directed toward strengthening the hands of existing agencies. To deal with this question intelligently it is necessary to know the nature of the legislation which these agencies are charged with enforcing.

The present situation may be summarized by stating that there are in effect today, as already stated, a limited number of housing codes, passed chiefly as state legislation, a large number of municipal building codes which cover much of the ground in housing codes although more particularly as to new construction, and a large number of municipal zoning ordinances which regulate heights of buildings and sizes of courts and yards, thus affecting the light and ventilation of buildings.

The line of demarcation between these various sets of regulations is not altogether clear, but the following distinctions may be noted.

The building code deals primarily with new construction, with very little emphasis on maintenance, and with main emphasis on fire hazards and structural conditions.

The zoning ordinance regulates the height, use, and area of buildings by establishing different zones within which requirements are uniform but not necessarily the same as in other zones. For instance, the size of light courts for dwellings may be different in one zone from that in another, thus providing a gradation of health conditions.

The housing code selects those features which affect the daily life of the inhabitants of dwellings and sets forth requirements intended to assure safe and healthful living conditions. The requirements are uniform throughout the city, in contradistinction to the requirements of zoning ordinances. Both new and old buildings are covered, and there is special emphasis on changes made in old buildings as well as on maintenance.

One of our sub-committee members,

John Ihlder, has given his views on the functions of various codes as follows:

> A housing code has to do with dwellings as dwellings. It deals with such matters as light and ventilation, sanitation, room arrangement, protection against fire, vermin, etc., from the point of view of the occupants of the dwelling.
>
> A building code has to do with buildings as buildings. It deals with materials, equipment, etc., primarily from the point of view of the structural safety.
>
> A sanitary code deals with insanitary conditions throughout the community from the point of view of the public health.
>
> A zoning code has to do with the development and use of private property throughout the community. It divides the community into a series of zones or districts and for each makes specifications as to permitted uses, proportions of lot occupancy, and bulk of buildings.

The arguments for the creation of a housing code rest essentially on the thesis that living conditions in dwellings are so important that regulations concerning them should be segregated in a separate document and preferably administered by a separate organization. In this way, it is held, scattered requirements are assembled and given coherent meaning under the enforcement of a specially trained organization having a sympathetic understanding of housing problems. It is maintained that when requirements affecting housing—particularly maintenance requirements — are scattered and under the jurisdiction of various departments, they are likely to be neglected.

The arguments against a housing code center on objections to superposing another code on the already top-heavy structure of municipal regulations. It is held that these requirements cut across the field of documents that already exist and that setting up another department adds to the number of inspectors who must force themselves on the public. Underlying these objections are probably fears on the part of existing officials that their current activities may be reduced to some extent, and that municipal appropriations already hard to get in sufficient size will have to be shared with a new agency. Further arguments advanced on behalf of the public are the complications involved in getting approval of building permit applications which an additional agency will have to review.

As matters now stand, the question of whether encouragement should be given to the development of housing codes is an open one, and one well meriting discussion by the committee.

In this connection, it is recommended that any decision be based on grounds of broad public policy rather than on the question of housing alone. There is a natural tendency for committees dealing with a given subject to consider that subject the most important one in the world and to fail to examine its relation to other subjects considered in turn by the committees dealing with them as most important. As a consequence, recommendations are produced that may not integrate well with others, and the question of the effect on broad administrative policy or public convenience is left almost untouched. This probably explains why many recommendations, excellent in themselves, fail to get anywhere. With careful attention to the place which recommendations should occupy in the general structure of police power regulations, there is an opportunity for this sub-committee to do a very constructive piece of work.

Housing Code Sub-Committee
MORTON G. LLOYD, *Chairman* *
JOEL I. CONNOLLY *
H. A. WHITTAKER *
J. M. DALLAVALLE
JOHN IHLDER
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* Members of Sub-Committee on Hygiene of Housing.

Looking Forward in the Bathing Place Sanitation Field*

Engineering Section

BATHING place sanitation continues to attract a constantly increasing amount of attention from the public. This interest naturally warrants additional consideration by health officials even though it may be argued that epidemiological evidence does not appear to warrant the conclusion that bathing places constitute a *major* public health problem. The public is justified in expecting that public health officials will do everything possible to promote steps to see that bathing takes place under reasonably sanitary conditions. Recreational demands enter into the problem and frequently dictate programs for improvement in such directions as pollution abatement undertakings rather than hasty arbitrary closing of somewhat questionable bathing areas.

An earlier committee of these associations prepared pioneering reports in this field of sanitation which have done much to promote more sanitary conditions, particularly with regard to small indoor and outdoor swimming pools. This committee in 1937 prepared a revised and enlarged report on the whole subject; this also discussed outdoor bathing places. This 1937 report has been published and widely circulated among the public health profession. Your committee during the past year circularized the sanitary engineers of the various state and provincial health departments and many of the larger city and county health departments, requesting the benefit of their criticisms and suggestions pertaining to the 1937 report. A number of comments have been received and are hereby gratefully acknowledged. The committee intends to take these as a basis for a revision of the 1937 report, to be presented to the two associations in 1940. A few brief remarks are presented here.

SWIMMING POOLS

Perhaps foremost among comments regarding recirculation swimming pools appears to be the widespread objection, based on operating experience, to permitting the desire to cut costs to dictate design for recirculation systems. A turn-over ratio of at least 3 (3 pool changes per 24 hours) and a maximum filter rate of 3 gals. per sq. ft. per min. are generally favored as minimum design allowances. Positive feed chemical machines rather than the old alum and soda ash pots are believed necessary for best results.

OUTDOOR BATHING PLACES

Despite the lack of conclusive epidemiological evidence as to diseases spread by outdoor bathing places, as already mentioned, and the very evident unreasonableness of too arbitrary

* Progress Report of the Joint Committee on Bathing Places of the Conference of State Sanitary Engineers and the Engineering Section, A.P.H.A.

standards for condemnation of outdoor bathing places, there is interest, especially among those who like standards for everything, in further detail of standards for outdoor bathing places beyond the conclusions already presented by the committee in its 1937 report. This brings attention to the dearth of extensive studies of bacteriological conditions of the waters of small and large lakes, rivers, and shore areas used for bathing. It would be highly desirable for state health departments to make such studies. The funds expended would undoubtedly bring ample return not only in giving the supervisory agencies and the public a truer picture of conditions of waters used for bathing and purposes other than drinking, but also in calling attention to pollution sore spots needing remedy. The committee strongly urges the carrying out of extensive studies of bacteriological condition of shore and inland waters and the allotment of funds for such purpose.

BACTERIOLOGICAL STANDARDS

The coliform group of bacteria has continued to hold its place as the principal criterion of safety of bathing waters. Attention continues to be manifested in streptococci as an index, especially because of possible spread of nose and throat infections by bathing waters, but no definite conclusions have yet been reached. Mallmann and others are devoting study to this.

SAFETY PRECAUTIONS

The total number of avoidable accidents at swimming pools and bathing places would probably be appalling if known, even in places where some degree of supervision is exercised. One state now has under consideration the adoption of sanitary code regulations relative to safety equipment at pools and public bathing beaches, and other states have certain general requirements. It is the expectation of the committee that a section devoted to safety precautions will be included in the 1940 report.

CONCLUSION

Your committee has been trying to avoid constant revision of its comprehensive reports but at the same time has endeavored to keep abreast of the important developments in the field of bathing place sanitation. There is no question of the handicaps of lack of definite knowledge, especially as to occurrence and tracing of sickness from bathing places. Research studies in this direction by interested public health agencies would be of decided benefit.

WARREN J. SCOTT, *Chairman*

Adviser from Laboratory Section A.P.H.A.
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Functions of Public Health Engineering Personnel*

Engineering Section

PURPOSE OF COMMITTEE

THIS committee was appointed during the 1938 annual meeting of the Association in Kansas City. Its purpose is twofold: (1) To define more clearly the proper functions of public health engineers and other personnel in environmental sanitation. (2) To suggest methods for more effective coördination and supervision of activities in the field of public health engineering and sanitation.

In its broader aspects this assignment includes the entire sanitation program of federal, state, and local health departments and numerous related services of other agencies. It is complicated by the wide variety of physical, financial, social, and governmental conditions which exist in this country. Definition of the desirable functions of personnel is closely related to the difficult problems of educational and personal qualifications. The coördination and professional supervision of sanitation activities is concerned with major aspects of public health administration and personnel management.

A group approach to these complex questions has been difficult. The committee could not arrange for a meeting, and the exchange of written opinions has been slow and cumbersome. Also no adequate data are available to permit an analysis of the volume and efficiency of public health engineering activities in relation to the type of service, the qualifications of personnel, and the methods of administration employed. Therefore, it has been necessary to depend largely upon the knowledge and experience of the members of the committee. From personal meetings with a few members and by correspondence, numerous individual views and suggestions were obtained. This report has been prepared by the chairman to represent the general consensus of opinion as nearly as it could be determined.

After a preliminary review of the scope of the assignment and of the possible methods of approach it was decided that, at present, the committee would:

1. Confine its attention to the activities of full-time health departments.
2. Consider these problems on the basis of available information and the experience of the committee members although a need for further administrative research in the field of environmental sanitation is recognized.
3. Accept the 3 approved reports of the Association Committee on Professional Education in regard to educational qualifications of public health engineers, sanitarians, and sub-professional field personnel in sanitation (sanitarian-assistants) as a basis for the definition of personnel functions.[1]
4. Submit as a progress report:
   a. A brief outline and discussion of certain fundamental considerations pertinent to the assignment as a whole
   b. A general classification of the functions of public health engineering personnel

* Progress Report of the Committee on Coördination of Public Health Engineering Activities.

c. General conclusions regarding the allocation of functions in relation to the educational qualifications of personnel

FUNDAMENTAL CONSIDERATIONS

A. *Nature and Scope of Public Health Engineering*

1. A number of different services are employed in the maintenance of public health, particularly those of two professions:
   a. Medical health service which is concerned especially with the effects of environmental conditions upon the human organism and the adjustment of man to his environment
   b. Engineering health service which utilizes the materials and forces of nature in the adjustment of the environment to man. When employed primarily for the protection and promotion of public health this specialized branch of engineering is called "public health engineering."
2. Public health engineering includes the public health aspects of all types of environmental conditions whose control is based upon engineering principles regardless of the magnitude or technical difficulty of the individual problems involved.
3. All procedures of federal, state, and local health departments which depend upon engineering materials or methods should be considered as public health engineering activities regardless of the professional qualifications of the workers by whom they are actually performed.

Comments—In the evolutionary development of public health administration there has been a tendency to classfy environmental sanitation problems as "engineering" or "non-engineering." Frequently the methods of approach to such problems have been selected on the basis of their magnitude, the extent of their influence upon public health, or the type of personnel immediately available. Such unscientific reasoning leads to illogical and incongruous conclusions. For example, a sewerage system for a town of 10,000 people might be classified as engineering while privies and small septic tanks to serve the same number of people in an unsewered area might be considered non-engineering. Yet the disposal of sewage and excreta in the two areas depends upon the same scientific principles, and employs practically the same materials of construction; the total cost is similar and about the same number of people might be affected. On the basis of unit size some administrators have decided that the water supply of a city is engineering while the milk supply is not; or that a large water supply requires public health engineering supervision but that a large number of small water supplies do not. The fallacy of such classifications is obvious.

The successful technical and administrative solution of many so-called "small" problems is very difficult. Much money has been wasted on sanitation devices and activities which did not conform to sound engineering practice. As a prerequisite to effective coordination and supervision of sanitation services, health officers, engineers, and others in administrative positions must recognize that all environmental sanitation problems—whether small or large, simple or complicated—are fundamentally engineering in character. They can then follow well established principles of administration to develop the best organization for the solution of these problems with the facilities available.

B. *Personnel*

1. A basic element in professional education is the development of a mind which is trained to meet individual problems in an original manner. The public health engineer can deal more effectively with the control of the environment because he is trained in the fundamentals of engineering science and procedure.
2. For economy and efficiency any extensive professional organization must supplement the services of its qualified workers by the employment of technicians and other sub-professional personnel or even individuals who are qualified in other professions. Such supplementary personnel should not be given assignments which depend upon professional knowl-

edge and experience which they do not possess. The need for special training of supplementary workers and their efficiency in the execution of well defined duties under adequate supervision has been amply demonstrated in various fields of medical and engineering endeavor.

3. The preparation of professional personnel should include opportunities for field experience under supervision. First-hand knowledge of procedures is important. This can be provided by the employment of professionally trained but inexperienced personnel in the supplementary activities mentioned above as a method of preparation for broader responsibilities.

Comments—In the selection of personnel for particular functions basic training as well as specialized ability should be considered. There is apparently a lack of appreciation of the respective advantages and also the limitations of public health engineers, sanitarians, and sanitarian-assistants in the public health program. Such confusion has been practically eliminated in other fields where professional supervision is well established. In a hospital, for example, physicians, nurses, technicians, pharmacists, dieticians, and others work together without uncertainty as to the essential rôle of each in the diagnosis and treatment of disease. On a large construction project skilled labor foremen, the superintendent of construction, and the resident engineer may perform specified functions efficiently but only under adequate supervision and within the limits of their training and experience. The same basic principles should be followed in the organization of public health engineering services.

C. *Administration and Supervision*

1. All public health engineering activities should be under the supervision of a competent public health engineer who should be directly responsible for all matters which affect their professional integrity.
2. The extent to which particular activities should be performed by sub-professional sanitation personnel and the details of engineering supervision will depend upon the nature of the problem, the feasibility of specifying definite procedures, and the capabilities of individual workers.
3. The administration of state and local health departments should provide for consultation and interchanges of service and information to maintain coördination of the work of public health engineering divisions and of other administrative units.

Comments—In order to provide effective supervision, major administrative responsibilities must be assigned to directors of public health engineering divisions. These should include not only approval of standards and technics but also the planning and technical supervision of the work and appraisal of the qualifications and performance of sanitation personnel. The assistance and influence of public health engineers should be further extended by consultations with other divisions.

DEFINITION OF FUNCTIONS OF PUBLIC HEALTH ENGINEERING PERSONNEL

A. *Classification of Activities*

Outlines of the activities embraced by environmental sanitation have been suggested repeatedly, three of which are cited at the end of this report.[1, 2, 3]

They are essentially classified summaries of environmental problems. Although instructive they do not suggest specifically the nature of the activities or the qualifications required.

B. *Classification of Functions*

This committee submits the following general outline of the principal functions of public health engineering personnel. It is believed that a classification in this manner is more amenable to study in relation to the need for particular qualifications.

1. Administration
   a. Executive—e.g.: Management of office; direction of personnel; budgets; purchases; etc.
   b. Professional—e.g.: Analysis of problems; planning of work; approval of

standards and procedures; appraisal of qualifications and performance of personnel; professional guidance of personnel; development of codes, regulations, and other legislation; etc.

2. Supervision of Environmental Conditions —(Implies mandatory regulation)
   a. General—e.g.: Throughout an area or in general terms
   b. Specific—e.g.: Regarding particular problems and involving specific details, etc.
3. Consultation—(Implies conferences, advice and stimulation of voluntary action)
   a. General—e.g.: Group approach regarding broad problems; interpretations; etc.
   b. Specific—e.g.: Regarding individual problems and specific details, etc.
4. Promotion—(Implies specific "sales objectives" not mere educational efforts)
   a. General—e.g.: Group approach through publicity or meetings; promotion of legislation or appropriations; etc.
   b. Specific—e.g.: Individual projects or items of improvement; compliance with specific requirements; etc.
5. Education—(Includes popular health instruction and field instruction of public health personnel)
   a. General—e.g.: Assisting in health education program, preparation of material; field instruction of groups of student public health personnel; etc.
   b. Specific—e.g.: Individual approach in training workmen, interpreting plans or explaining legislation; training student personnel in particular technics; etc.
6. Investigations—(Includes technical studies, special investigations, and sanitary inspection)
   a. Fundamental Research—e.g.: Coöperative research projects regarding unknown factors or influences, etc.
   b. Practical Research—e.g.: Study of known or accepted data to determine applicability in particular situations; etc.
   c. Surveys—e.g.: To determine details of sanitation service required or afforded in particular jurisdictions; to determine status of sanitation in given areas; etc.
   d. Routine—e.g.: Sanitary engineering investigations; sanitary inspections; etc.
7. Design—(Includes public health features and sometimes all details of structures, machines and devices which are of importance to health)
   a. Original—e.g.: Standard plans for privies, dairies or screens; small engineering projects; etc.
   b. Review and Approval—e.g.: Water works; sewerage systems; ventilation systems; buildings; impounded waters; milk plants; food plants; etc.
8. Office—(Non-administrative)
   a. Clerical
   b. Drafting
   c. Miscellaneous

C. *General Conclusions Regarding Allocation of Functions*

1. Only fully qualified and experienced public health engineers should be directly responsible for:
   a. Administrative direction of major divisions of public health engineering service
   b. A controlling influence in the selection, training, supervision and advancement of all grades of public health engineering and sanitation personnel
   c. Final approval of policies, codes or manuals prescribing standards, procedures and technics to be applied in public health engineering activities
   d. General supervision of all phases of environmental sanitation
   e. Specific activities requiring an engineering background and also the exercise of authoritative judgment in regard to consultation, promotion, education, investigation, or design
2. Only graduate engineers with public health engineering training and experience adequate to their responsibilities should be employed for:
   a. Acting or assistant directors of major divisions of public health engineering service
   b. Direct supervision of plants or conditions which requires technical engineering knowledge
   c. Engineering investigations, surveys and research and the preparation of reports and designs pertinent thereto
   d. Technical supervision and appraisal of state and local public health engineering activities

   - e. Analysis of designs and tentative conclusions regarding their adoption or approval
3. Either relatively inexperienced graduate engineers, sanitarians, or sanitarian-assistants with qualifications commensurate to their duties and with adequate supervision, guidance, and assistance by public health engineers should be employed for:
   - a. Supervision of sanitation in the smaller units of public health organization where fully qualified public health engineers cannot be provided on a full-time basis
   - b. Any activities which do not require extensive engineering knowledge and in which the engineering considerations and conservative procedures can be defined in general terms for practically all conditions which will be encountered
   - c. Routine inspections, collection of specific items of information, collection of specimens, and other activities which are time-consuming and amenable to quite exact definitions and instructions
   - d. Educational and promotional work through frequent contacts with individuals and small groups of people

CLOSING COMMENTS

This report is intended only as a general summary of the more important elements in the problems under consideration. It is hoped that further thought and discussion may be stimulated. More definite suggestions regarding methods of coördination are obviously needed.

No analysis of the effectiveness of state and local programs under different conditions of supervision could be attempted because of lack of data. A comprehensive research study of certain administrative problems as previously suggested would be most valuable. It is suggested that the Divisions of Public Health Methods and Domestic Quarantine of the U. S. Public Health Service be requested to undertake jointly such a study in a representative number of state and local health departments.

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Disinfection of Dishes and Utensils

Engineering Section

THIS report is a preliminary or progress report, reviewing in a general way the problem of disinfection of dishes and utensils as it appears to your committee, and outlining a suggested program for future committee activities.

Health officials have long realized the necessity for greater cleanliness of glassware, dishes, and utensils in food purveying establishments, and most states and many municipalities have made some approach by enactment of regulations aimed to assure to the public safe, clean equipment for the preparation and service of foods and drinks at public eating places.

However, such regulations approach the problem from many different angles. Many outline in considerable detail methods or procedures to be carried out in washing and disinfecting such equipment; others are evidently too theoretical or complicated to admit of practical administrative control or enforcement. With but rare exceptions, they do not indicate the results desired or provide any method of determining whether or not such results have been attained.

There exists, therefore, a very confused situation affecting not only administrative health officials but also the manufacturers of mechanical equipment, the producers of washing and disinfecting chemical compounds, and the operators of food serving establishments. Equipment and compounds which are approved in one area may not be acceptable in an adjacent area; nor is there available any basis or guide whereby a purchaser of equipment, some of which is costly, can be assured that it will or can meet legal requirements.

Before your committee could hope to prepare for approval by this Association any definite recommendations, it is necessary to:

1. Clarify and state in specific terms the results which it is desired to attain.
2. Outline some basic standards whereby it can be determined whether the desired results have been attained.
3. Present sufficient basic data to establish reasonable grounds for a very general acceptance of any committee recommendations.

While a great deal of study has been given to the subject by individual investigators, we do not feel that the results so far obtained, as evidenced by available literature, present the needed basic data upon which to proceed. Your committee and this Association as an association, do not possess the facilities to obtain such data. There are, however, prospects that such data may be made available through proposed studies of a more comprehensive nature than have yet been made, so far as your committee is aware.

Last May this committee was represented at a meeting in Geneva, N. Y., at which were present representatives of New York State and several local health organizations, manufacturers of dish washing equipment and of cleaning and disinfecting compounds, the National Hotel Association, and others interested in the problem. As a result, it is now proposed to carry on studies subsidized by the commercial interests involved as a project under the direc-

tion of Cornell University, with the actual work carried on through the New York State Agricultural Experiment Station at Geneva, N. Y.

The preliminary plans contemplate the establishment of standards of accomplishment of equipment or chemical compounds, with the responsibility of meeting these standards resting with the manufacturers and food purveyors, an obligation which they have expressed willingness to accept.

Complete details as to such plans should come from those in responsible charge of the studies. It is understood that funds have been assured for the starting of the studies and it is probable that at this meeting of the American Public Health Association, the Association will be asked to coöperate with the project through an advisory committee in the planning and conducting of the studies.

Your committee feels that such procedure if adopted, will give national character to the studies and will justify the lending of the prestige of this Association to recommendations which may be based on the data collected so that there may develop some uniformity in regulations adopted by official administrative health organizations.

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Shellfish*

Engineering Section

THE Shellfish Committee of the Engineering Section 4 years ago adopted the policy of concerning itself each successive year with the particular phase of the shellfish problem which seemed to be most urgent. At that time the committee felt that more rapid progress in shellfish sanitation control procedures depended upon the discovery of a more satisfactory method for examining shellfish and shellfish waters. Each year since then, although its reports were successively concerned with various subjects, it has pointed out this need.

The 1935 report was concerned with standard methods for examination of shellfish; in 1936 water storage, conditioning, and cleansing of shellfish was considered; in 1937 the revision of the Public Health Service Minimum Requirements for Endorsement of State Shellfish Control Measures and Certifications for Shippers in Interstate Commerce was the subject of the committee's report; and in 1938 its report discussed the factors to be considered in determining the areas from which shellfish may be marketed directly.

In adopting the above policy the committee has had in mind—as stated in previous reports—the desirability of the publication by the American Public Health Association of a manual on shellfish sanitation, and has prepared its several reports from year to year with the idea that these yearly reports might constitute, with a little editing and revision, chapters in the manual when and if it is published. One of the members voiced the sentiments of the committee when he said he had never been connected with a problem that lasted as long as the shellfish problem.

The committee this year again held an all day meeting at the same time and place as the annual meeting of the National Shellfisheries Association and the Oyster Institute of North America (July 8–9).

It was intended to devote this year's report to a study of methods of rating shellfish plants somewhat after the manner of rating milk control. However, it seemed to the committee that the more important problems of further perfecting shellfish cleansing processes and reviewing some changes proposed by members of the committee from the Laboratory Section in the laboratory methods for examining shellfish were sufficiently important to include in the report.

Therefore, this year's report records (1) progress in shellfish cleansing, (2) thoughts regarding laboratory methods, and (3) a score sheet for measuring compliance of shucking houses with the " Minimum Requirements " of the U. S. Public Health Service.

The section on clam cleansing in Massachusetts dealing with progress made in that field during the last 2 years was prepared by Sanitary Engineer Edward Wright, a member of this committee. Those portions of Mr. Wright's report presenting new material are quoted here.

* Progress report.

"*Clam Cleansing in Massachusetts*

"It is of interest to point out that the two plants now in operation in Massachusetts, namely, the municipally owned plant in Newburyport and the privately owned plant at Scituate have recently been visited by officials and citizens of New York State who have been interested in the establishment of a quahog cleansing plant at Staten Island, and representatives of the Ministry of Health of Canada and others in connection with the possible establishment of a plant in Nova Scotia.

"During the past year the Scituate plant treated 1,729 barrels of quahogs obtained from Fall River and New Bedford harbors, in addition to its soft shell clam business. The process carried on in quahog purification is practically identical with that used in Massachusetts for soft shell clams, excepting during the colder 8 or 9 months of the hibernating season when it becomes necessary to heat the treatment water to above 50° F. This has been accomplished by placing heating coils in the bottom of two or three of the various tanks and passing live steam through these coils. The cost of heating the large tanks is considerable and, feeling that the management might not always provide the necessary heat, a recording thermometer has been installed so that a definite record of the temperatures has been made available.

"So far as can be determined, both analytically and from a commercial standpoint, the treatment of quahogs from moderately contaminated areas has been satisfactory, but it should be pointed out that the quahogs obtained from the contaminated areas for treatment purposes are of the chowder size rather than the little neck or cherrystone size which would be eaten raw.

"It has been found practicable for the Massachusetts State Health Department to open some 17 comparatively small areas in Boston Harbor where clams were suitable for purification. In addition to the Boston Harbor areas, the department has approved certain portions of the following harbors: Newburyport, Salem, Lynn, Cohasset, Plymouth, New Bedford, and Fall River.

"In approving these areas, the procedure is quite similar to that used in approving clean areas, with the emphasis on the sanitary survey and the quality of the overlying sea waters, but instead of the usual standard for condemning areas where the overlying sea waters contain coli aerogenes in 1 cc. in more than 50 per cent of the samples, this has been multiplied by 10 and areas for taking shellfish for treatment purposes where the overlying sea waters consistently contain coli in 0.1 cc. portions in more than 50 per cent of the samples have not been approved.

"All shellfish taken from contaminated areas by a master digger (who is placed under a $500 bond) are tagged with duplicate numbered red tags carrying detachable sections stating that the shellfish come from contaminated areas and indicating the quantity. These tags may be removed by the operator of the purification plant. The detachable sections are given to the master digger and are sent by him to the supervisor, and the purification plant manager returns the original numbered half to the supervisor by whom the numbered tags are checked with the numbered sections sent in by the master digger. In addition, the master digger is required to file a weekly report with the supervisor even if he has taken no clams, showing the date, location of the flats, generally by number, number of diggers, quantity, tag numbers used, and other data, and a receipt in duplicate is prepared by the manager of the shellfish purification plant for the supervisor. This information is checked with the red tags. The master diggers or truck drivers carrying on this business are required to pass over a specified route to the purification plant.

"In order to comply with the minimum requirements for tagging, a new form of numbered tag for purified shellfish has been developed which carries the following information: number of treatment plant, quantity, date released, and master digger's permit number. The tag is attached to each container and a duplicate section is retained at the plant and forwarded to the department.

"To assure compliance with the department's rules and regulations, frequent inspections are made at unannounced times by representatives of the department who carefully inspect the treatment plants, both as to the methods of treatment and as to laboratory control. The department's rules and regulations require that two samples of each lot of raw clams be analyzed at the plant laboratory, while four samples of each lot of treated clams are analyzed. This information, together with information as to the quantity of clams treated, the time and amounts of chlorine added to the tanks, the temperature and salinity of the treatment water, and other similar data, gives the department reasonable assurance that the process is being carried on properly.

"There has been some interest in carrying on the treatment of oysters, mussels, and other kinds of shellfish. The department's experience with oysters, however, has shown that they are so sensitive to changes in en-

vironment, temperature, and salinity, that this form of treatment of oysters coming from contaminated areas is not felt to be wholly reliable. The report of the Lawrence Experiment Station for 1937, however, contains a statement that experiments on the purification of mussels indicate the probability of successful treatment of this shellfish by the same method used for soft shell clams. The mussel market in Massachusetts is so meager, however, that this process has not yet been carried on on a commercial scale.

"The Massachusetts law provides for assessing the cost of shellfish treatment upon the municipalities responsible for the pollution of the growing areas.

"There is a sewerage system at Salisbury Beach operated by the Salisbury Water Supply Company and the Legislature of 1937 revised the earlier General Laws, chapter 130, sections 76 to 79, inclusive, so as to provide that the Salisbury assessment for supporting the operation of the Newburyport cleansing plant might be made in part against the Salisbury Water Supply Company.

"The department has been requested recently to review its original determinations because of the 1937 change in the law and has made additional findings based on the population and water consumption of the cities and towns discharging sewage into the Merrimack River and inversely as to the distance from the center of the flats. Three commissioners, appointed by the Supreme Court to review the department's reapportionment, have confirmed the department's method in their report to the Supreme Court. Most of the municipalities involved in the original determination have paid their assessments to the City of Newburyport, though one or two have failed to do so, and the matter has been thrashed out in the courts, with a resulting order directing the municipalities to pay their assessments. It is to be assumed that the set-up of the law as roughly outlined above is constitutional. In view of the delay in payments by certain of the municipalities to Newburyport, the mayor of the latter city has recently submitted a bill to the Legislature under which the state would be required to pay for the operation of this plant. The bill has been rejected in part because of the

TABLE 1

Median Scores of Raw and Treated Shellfish—1938

	Raw		*Treated*		*Average Treatment Period in Hours*	
Month	*Newburyport*	*Scituate*	*Newburyport*	*Scituate*	*Newburyport*	*Scituate*
January	50	41	23	4	29	25
February	50	32	18	3	34	27
March	50	32	23	3	34	25
April	140	32	23	3	39	26
May	50	23	14	3	37	24
June	50	23	14	3	30	24
July	50	23	14	3	32	24
August	50	not operating	14	not operating	30	not operating
September	41	23	14	3	27	26
October	41	41	14	3	30	27
November	41	32	14	3	31	27
December	32	50	14	4	32	26
Yearly median	50	32	14 *	3 †		
Average (hours)					32	26

* Maximum for year 50
† " " " 32

Number of Bushels of Shellfish Treated at the Plants for the Last Few Years

	Newburyport (bushels)	*Scituate (bushels)*	*Plymouth (bushels)*	*Total (bushels)*
1936	18,780	.....	10,326	29,106
1937	23,308	4,199	.....	27,507
1938	25,578	11,196	.....	36,774

(3 bushels = 1 barrel)

probability that the state would then be required to finance any other plants that might be constructed.

"Statistics as to the amount of shellfish treated at the two shellfish purification plants and the median scores of the raw, and treated shellfish for the year 1938 are given in Table 1."

This process of purifying shellfish has given employment to a very considerable number of shellfishermen, many of whom have never had any other employment. With the machinery for following the shellfish from the beds to the markets, and the efficiency of treatment, it is felt that the process is a desirable one from a commercial and economic standpoint. From a sanitary standpoint its chief advantage is that it has a decided tendency to check bootlegging of shellfish from contaminated areas. Neither of the plants is located as close to one of the main sources of supply, namely Boston Harbor, as is desirable, but it is understood that private interests are now considering the construction of a privately owned plant within the Metropolitan District.

J. B. Glancy and M. H. Bidwell, members of the committee, prepared a report on a survey of some 7 New York water storage shellfish plants, all located on Long Island. Excerpts from this report follow:

"*Water Storage Plants in New York State*

"*Water Intakes*—Most of the intakes in the New York plants extend to fairly good quality water which, of course, scores regularly below 5. We think, however, most of the intakes should be carried out still further to get away from possibility of chance pollution. Incidentally, the complete detailed layout of all water storage systems should always be on file with the health officer. This would include the exact location and type of water intake. Since it is necessary from time to time to raise the intake for new screening the health officer should inspect it.

"The intake line should not leak. To detect leaks in an intake line the intake should be raised and a head of water put in the line should hold its level. There should be no valves in the intake line which would permit taking water from any other source than the one approved. Frequent bacteriological tests should be made of the raw water in the vicinity of the intake. The intake should be located well below the low water of spring tides. Also, the location should be one that does not take excessively riled water due to high winds or passing boat propellers.

"*Pumping*—Plants having centrifugal pumps which are primed off the fresh water lines should be examined for cross-connections. Self-priming pumps have given very satisfactory service. Gages should be placed both on suction and discharge lines.

"*Chlorination*—It is absolutely necessary that the chlorinating system be kept in first class working condition at all times. There is a temptation on the part of operators to continue pumping when something goes wrong with the chlorine system. *It should be a rule that no water may be used for water storage that has not been chlorinated.* Provision should be made in all plants so that an adequate supply of chlorine is always on hand.

"Five of the 7 plants in New York use pedestal type manual control chlorinators. These demand care and should be inspected frequently by the health officer. A good supply of spare parts such as gaskets, washers, valves, etc., should be on hand.

"During the last few years all the chlorinating apparatus has been adapted to feed the injector off the fresh water line. This has given excellent results compared to the previous years when sea water was used to inject the chlorine.

"During the colder months there is a possibility of chlorine ice forming in the machines. Therefore, they should be equipped with adequate heating devices. At the West Sayville plants this has been accomplished by placing a few strong electric light bulbs close to the metering chamber. Also, the compensator should be nearer the heating source than the tank to prevent liquefaction of gas in the compensator. Operators should be instructed unfailingly to run all unchlorinated water to waste.

"Scales should be used to weigh the chlorine in the chlorine tank frequently and when the tank is almost empty it should be changed.

"At the present time none of the water storage systems apply a detention period to the water used. While this does not seem imperative because the basins in which the oysters are stored may be considered as detention tanks, it is recommended to insure safer and better water treatment. The committee should consider the advisability of requiring well designed detention tanks giving at least

a 15 minute period in any new water storage treatment plant.

"*Storage Basins*—Inspection reveals the possibility of contamination entering storage basins from floors or walks. Just how to eliminate this is a problem. Men step from the walks into the tanks to fork out the shellfish. They should be required to wear only sterilized boots while working in the storage rooms.

"Again, containers of sorted shellfish may be taken from the floor and placed in the storage basins. The health officer should observe closely the methods used in the various plants and make suggestions to avoid this type of contamination.

"Shellfish destined for water storage systems should be taken from certified beds only and handled almost aseptically from the bed to the storage basin. The rule is clean boats, bins, containers, and sorting operations.

"*Preliminary Washing*—Storage plants should regularly provide facilities for washing stock thoroughly in chlorinated water before placing it in the storage basins. Almost all plants hose the shellfish with chlorinated water before filling the tanks. While this appears to accomplish washing, it really does not. The top layer can be cleansed but not those below and much of the material hosed stays in the tank. It contains at times marine growths which are prone to lower the oxygen available in the water. No methods have been perfected yet for preliminary washing. The committee should study this subject further and consider the advisability of requiring preliminary washing in all cleansing and conditioning plants.

"*Aeration and Continuous Flow*—No form of aeration is used in the New York water storage systems. As a general rule, the operators have learned by experience that during the warmer months shellfish are liable to suffocate if the water is not changed frequently. Others depend on a continuous flow of water. This has the disadvantages of causing chlorine tastes in the shellfish, comparatively large amounts of water are necessary, and if the water becomes riled during windy weather, objectionable sedimenting occurs in the storage compartments. Judging from studies made, it would seem that a combination of aeration and continuous flow would give the best conditions.

"*Water Storage Rooms*—The storage of shellfish in water is an operation which should be segregated from all other activities to preclude the possibility of contamination. In some plants, walkways directly over the water storage basins lead from one part of the plant to another. Entrances and exits to water storage rooms should be posted with signs to exclude all unauthorized persons.

"*Personnel*—In all water storage plants there should be some responsible individual in charge who is thoroughly capable of operating the plant in a safe manner. The health officer should pass upon his knowledge of the operation and the manner in which it is discharged, and should exclude incompetent persons.

"*Conclusion*—Some health officers are beginning to advocate the universal adaptation of controlled water storage of shellfish to all plants as a method to enhance the sanitary quality of the product as well as to insure its marketability. At the present time full utilization of the method still seems a long way off. Progress has been relatively slow due largely to the toleration of storage in natural bodies of water in certain shellfish producing states. It is hoped that by bearing in mind the principles pointed out in this memorandum stimulation will be given to better, practical, safe, and economical design."

RATING SHELLFISH SHUCKING PLANTS

A good deal of thought has been given by certain members of the committee to the development of a scheme which would permit assigning a numerical figure to a shellfish shucking house which would express its approximate compliance with the U. S. Public Health Service "Minimum Requirements."

A rating form has been devised which when used with instructions prepared for that purpose enables an inspector to evaluate the degree with which the construction of the house meets with the specifications laid down in the Minimum Requirements and also the degree with which the house is operated according to sound sanitary practices as outlined in the same Minimum Requirements.

For each item in the rating sheet there are corresponding paragraphs in the instructions which set forth (1) the requirements to be met, (2) the public health reason for the requirements, and (3) what constitutes satisfactory compliance.

In the interests of brevity the instructions are not included in this report; however the rating sheet is reproduced

(Table 2) in order that progress in this field may be recorded and stimulated. It should be pointed out that the principal use made of this rating sheet is to compare compliance of shucking houses in one area or jurisdiction with compliance of those in another area. It is not recommended for routine use by the state inspectors as the basis for requiring correction of unsatisfactory structures or practices.

It is believed that a second rating sheet should be prepared for shellfish houses handling shell stock only, and that a third sheet should be prepared to apply to an entire state in order to measure state compliance as a whole with the Minimum Requirements.

The committee will welcome suggestions for or criticisms of the sheet presented or of the plan to extend the rating idea to the additional phases of the shellfish problem.

As pointed out in the beginning of this report, the need for more satisfactory methods for the examination of shellfish has long been felt, and a certain amount of work has been done already

TABLE 2

Shucking Plant Inspection Rating Sheet

Name .... Date ....

Location .... Cert. No. ....

No. Gals.: Day .... Season .... No. Shuckers ....

	Item	*A. Construction & Equipment*	*B. Operation & Maintenance*
Storage & Shucking	1. Shell Oyster Storage	40	40
	2. Shucking Benches, Stands	15	25
	3. Shucking Utensils	30	30
	4. Storage of Pails, Utensils	15	15
	5. Floors	15	15
	6. Walls, Ceilings, Light	15	15
	7. Hand Washing	40	40
	8. Sterilization	25	25
	9. Clothes, Gloves, Guards	15	15
Packing	10. Screening	15	15
	11. Walls, Ceiling, Light	15	15
	12. Floors	15	15
	13. Skimmers, Paddles, Measures	20	25
	14. Blowers, Tanks	25	30
	15. Refrigeration	20	30
	16. Packing Cans	30	40
	17. Sterilization	25	25
	18. Clothes, Gloves, Guards	15	15
Miscellaneous	19. Building	15	5
	20. Toilet, Privies	20	20
	21. Water Supply	50	10
	22. Personnel	0	5
	23. Disposal: Shells, Wastes; General Storage	25	30
	Physical and Operating Rating	500	500

Sanitary Rating (basis 100) =

Principal Items in which there are deficiencies:

(Principal shipping points and remarks on other side)

in various laboratories. In a communication received from the chairman of the Committee on Standard Methods for the Examination of Shellfish, James Gibbard of Ottawa, Ontario, Canada, he outlines his conception of the problem. Excerpts from his communication follow.

"METHODS FOR THE EXAMINATION OF SHELLFISH

"If we consider shellfish from two standpoints, (1) production and (2) distribution, I think the problem tends to clarify itself.

"In the production of shellfish the sanitary engineer has the major responsibility. It is up to him to determine the source and volume of pollution and the hazard that it might create by contaminating shellfish beds. The bacteriologist can supply the engineer with data which will assist him in defining the extent of pollution. The engineer can, however, place a fair share of the responsibility upon the bacteriologist by consulting with him in regard to the interpretation of the bacteriological analysis in light of the sanitary survey data.

"When shellfish are offered for sale or are handled by shucking houses, shell stock dealers, etc., the bacteriologist is frequently asked to supply information concerning their safety. The sanitary engineer can make sure that equipment in establishments meets the minimum requirements, but because of the personal factor he cannot determine the risk of pollution which may vary from day to day or hour to hour. After all, it is the shellfish as a food product which is the basis of all our considerations. It is obvious that the bacteriologist and the sanitary engineer have different problems, but the closest coöperation is essential to a proper understanding and intelligent enforcement of public health control measures.

"When one considers, first, shellfish growing waters certain problems arise immediately. There is less accurate information concerning the behavior of sewage pollution in salt water than in fresh water. We have attempted to carry over our experience in studying pollution in fresh water to salt water and I do not think we are quite justified; nevertheless, we have been able to effect a degree of efficient control, but this particular problem requires a great deal of intensive study. We would like to know the relative significance of typical *Escherichia coli* and other organisms of the coliform group. It is understood generally that a high index of *Aerobacter aerogenes* in fresh water indicates remote pollution or self-purification. Is this true in salt water? The stratification of fresh water pollution in salt water, tidal effects, and salinity all need careful study. In fresh water *Escherichia coli* is generally taken as an index of possible pollution by disease producing enteric forms of bacteria. The viability of the pathogenic group is generally considered to be shorter in salt water than in fresh water. Can any practical use be made of this fact? Although these questions all need to be studied carefully, that is no reason for not applying the information which we have obtained to date and I would consider us derelict in our responsibility if we did not make strenuous efforts to bring our methods up-to-date, even if they are changed next year.

"Finally, I sincerely hope that everyone who has an opportunity to study shellfish purification will do so with even more activity, for it is my opinion that we must eventually treat all shellfish by some method which may be described as being akin to the pasteurization of milk."

A good deal of discussion took place with reference to the need for a resurvey of shellfish problems and particularly for someone to correlate and give direction to the work being done in state laboratories. Further progress in shellfish cleansing depends largely upon a more satisfactory method for determining significant contamination remaining in cleansed shellfish, particularly oysters.

The committee adopted the following resolution, and in view of the fact that it is almost identical in tenor with a resolution adopted by the Governing Council last year, and in view of the urgency of the matter, it was the sense of the committee that the resolution should be brought to the attention of the Surgeon General of the U. S. Public Health Service at an early date. This was done later by the Executive Secretary, after taking the matter up with the Section Council.

"In view of the fact that there are many important problems in connection with shellfish sanitation that require intensive study, it is the consensus of opinion of this committee that the U. S. Public Health Service should undertake investigations in this field

and should endeavor to correlate the studies being made by state and other agencies."

We are happy to advise that only last month steps were taken by the U. S. Public Health Service which indicate that research will be undertaken by the Service before the expiration of the present shellfish season.

L. M. FISHER, *Chairman*
M. H. BIDWELL
J. B. GLANCY
RICHARD MESSER
SOL PINCUS
WALTER SCOFIELD
R. E. TARBETT
EDWARD WRIGHT

Programs for Training of Water Works Operators*†

Engineering Section

THE important findings resulting from your committee's previous studies of the systems of control over the safety of water supplies are briefly restated as follows:

1. Lack of adequate personnel and laboratory facilities in local health departments and the inherent difficulties of part-time local health services are the principal obstacles to adequate sanitary control over water supplies by local health officials.

2. In most communities, the condition or assured safety of water as received by consumers is unknown, but is assumed from favorable results of occasional analyses or the record of past freedom from water-borne outbreaks. Relatively, only a few communities maintain an adequate system of sampling from representative points on distributing systems. Lack of local laboratory facilities and trained personnel in water departments are the principal factors contributing to this situation.

3. In the interests of economy as well as health, all public water supplies should be under the charge of qualified persons equipped with the facilities requisite for their work. In many cases and to offset the handicap of unqualified, inexperienced, or part-time operators, or the lack of laboratory facilities, employment of the services of expert water chemists or consultants is highly desirable.

4. Aside from necessary physical improvements to water works, the appointment of properly qualified superintendents and operators, and provision of adequate local laboratory control facilities constitute the outstanding needs for efficient and adequate control over saftey of water supplies by local water authorities. Political expediency and failure of local municipal officials to appreciate the requirements in this respect account to considerable extent for the slow progress which is being made toward meeting these needs.

5. Additional and sufficient personnel in engineering divisions of state health departments is cited as the one basic need for development within such departments of well coördinated programs of water supply control, including intensified programs for the training of water works operators. Adequate provisions in this respect would do much to strengthen the controls as exercised by local water authorities which always should be regarded as the primary bulwark of protection against water-borne outbreaks.

6. It is generally apparent that the controls exercised over the water supplies of camps, schools, institutions, summer resorts, etc., are grossly insufficient. There is an outstanding need for a positive and comprehensive system of supervision by health authorities which will bring these semi-public water supplies under substantially the same degree of control as provided over public water supplies. This can be done only if state and local health departments are properly equipped to render such service.

The above findings attach considerable importance to the problem of securing appointment of qualified personnel in local water departments.

Progress toward the ultimate objective of the placement of properly qualified persons in positions which involve responsibilities over the safety of water supplies is being accomplished by educational efforts, by the development of civil service or licensing procedure, and by efforts to train as much as possible the existing operators in the funda-

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* Report of Committee on Water Supply.

† To conserve space in the printing of this report, it has been necessary to condense it considerably, with the omission of certain portions relating to correspondence or extension courses and in-service training in water departments of large American cities, as well as an appendix giving detailed information concerning water works operator short courses.

mentals of the practice and the duties of their positions. Divergent opinions exist with respect to the requisite qualifications of superintendents and operators and with respect to the efforts which are directed toward their "in-service" training.

In view of the importance of and wide interest in these subjects, your committee this year has undertaken to assemble information and opinions bearing upon them. It has been concerned specifically with training programs and their possible influence upon the appointment of properly qualified personnel in water departments.

It presents herewith a discussion and compendium of opinion relating to these subjects obtained through questionnaires circulated amnog the various state sanitary engineers and through correspondence with many university professors and others who either have been closely identified with such training programs or who are regarded as particularly able to contribute valuable opinions concerning them.

TRAINING ACTIVITIES CARRIED ON BY STATE HEALTH DEPARTMENTS

Forty out of 42 states reporting carry on some program for the training of operators or superintendents at times of water supply inspections. In 2 states, where this practice is not followed, operators and superintendents are regarded as well qualified as a result of operation of a state licensing act and careful selection under civil service procedures.

The qualification levels of operators or superintendents apparently vary widely from state to state. To an inquiry requesting opinions on the abilities of those in charge of water supplies to learn and apply the fundamental tests and procedures requisite for careful, intelligent, and safe operation, the estimates in Table 1 were obtained. (Figures show the number of states reporting the indicated percentage of operators in each class as competent or capable of development as competent operators.)

A brief consideration of these figures leads to the commentary that for all classes of water superintendents or operators there are still an astounding number who probably will never develop into satisfactory personnel. Lack of basic education is an obstacle that no program of operator-training is likely to overcome.

Practically all replies indicated that such efforts at training had contributed to improved operation of water supplies, and had served to promote relationships between municipalities and state health departments. Two-thirds of the replies indicated that such training activities had served in a substantial way to impress upon local appointing officials the need for appointing or retaining technically trained men in operating positions.

Three-fourths of the replies favored some extension of this type of training activity. Many replies emphasized the need for coördinating such systems of training with some licensing plan so that operators and superintendents in the future will possess more basic knowledge than has been the case generally in the past.

In most states, the general objective of securing the appointment of qualified

TABLE 1

	Per cent of Operators Reported as Competent or Capable of Development as Competent Operators									
Class of Water Operators	*10*	*20*	*30*	*40*	*50*	*60*	*70*	*80*	*90*	*100*
Untreated ground	2	1	1	1	6	..	7	1	4	5
Chlorinated ground	..	1	..	2	2	2	6	3	5	10
Untreated surface	1	1	..	..	2	..	2	1	3	3
Chlorinated surface	..	1	1	1	6	2	2	1	7	5
Filtered surface	..	1	1	1	5	..	3	2	10	9

personnel to operator and superintendent positions has not been reached or even closely approached. In these states such training activities are considered as essential features of the water supply control programs, and the reasoning back of these efforts at training seems to be somewhat akin to the following:

The safe, intelligent, and proper operation of water supplies is dependent to considerable extent upon having the supplies under the charge of qualified superintendents and operators. If all these were qualified by training and experience for their positions, there would be no need for health departments to be concerned with their further training. But such condition has not been reached. State health departments have little if any control over local appointments and, due to pressure of local politics or lack of appreciation of the requirements on the part of local appointing officials, many poorly trained or even incompetent persons are placed in responsible water works positions. Some of them, many years in service, are fairly well entrenched, so much so in fact, that whenever there is a movement toward some state licensing procedure, it is necessary generally to make provision for the exemption of existing operators under a so-called "grandfather's" clause.

Laudable as the general objective may be of securing appointment of thoroughly qualified persons to such positions, state health departments are confronted with the practical problem of securing the proper and safe operation of water supplies with sub-qualified or incompetent personnel in many instances. Under such circumstances the state health department can look three ways toward improvement of this situation. It can seek to educate local appointing officials and the general public as to the desirability and need for employing competent and properly qualified persons in such responsible positions, hoping for the time when there will be sufficient recognition of this truth to result in the general condition already achieved by two states. It can work for and exert its influence in behalf of some effective licensing or civil service procedure which at least will govern the qualifications of operators in regard to new appointments. It can undertake to train existing operators as much as possible in the fundamental duties of their positions so that at least there can be some improvement in the operation of those water supplies which, regardless of what may be desirable, are likely to remain under the charge of present personnel for some time in the future. The general objective of this type of training seems to be, not to elevate local operators to a position of prestige above that warranted by their abilities, but to make better operators out of the existing operators in order to achieve such improvements as are possible in water supply operation.

Most of the states it is believed have undertaken their operator training activities under the general theory advanced here. At the same time in divers ways they have proceeded in the other two directions which seem to be open for improvement of the situation and which are involved with any scheme of training for existing operators. There seems to be ample evidence that such training activities serve in a substantial way to educate local officials and the general public as to the need for employing or retaining qualified persons in such positions. Further, such training activities build up good will among operators which is probably essential as a preliminary step toward the establishment of some effective licensing procedure in most states.

With respect to this type of training activity, there was no particular criticism from any of those with whom the committee corresponded. On the other hand, there was general agreement upon

the part of the state sanitary engineers that such training activities were thoroughly justified and that they should be extended as much as possible, particularly through more frequent and longer visits at plants with greater emphasis placed upon the problems peculiar to each plant.

It is apparent too, in the replies of many of the state sanitary engineers and others, that they do not feel that positions as superintendents and operators should be reserved in all instances for the college trained engineer. They seem to recognize that there are some supplies, particularly the smaller supplies and those involving only the simpler forms of treatment or perhaps no treatment, where operators who are not college trained but who have the capacity and enthusiasm to learn or who have had many years of experience may serve the community equally as well as the graduate engineer, or may be readily developed into operators of exceptional ability for the particular plant in question. This same thought has been translated into regulations in most if not all of the states which have adopted some licensing procedure by requiring education at the college level only in the case of operators in certain grades. This view perhaps may have originated out of the practical necessity of taking into account the case of the existing operator.

It is possible and quite likely that in the future there will be a general tendency to increase the minimum educational requirements specified in such regulations, perhaps to the point where college trained men will be required for most of the positions. But it seems unlikely that this will come about until death terminates the services of most of the present generation of operators and there has been a substantial increase in the general qualification level of all operators. It is apparently an idea that can be applied with increasing success in respect to new appointments, but is without application in the case of many operators now employed and who are likely to be retained in their positions for many years to come.

SHORT COURSES

Considerable information was obtained concerning short courses as given in a number of states. These courses vary considerably. In general, however, they may be divided into two kinds, which for convenience are referred to as "conference" and "laboratory" types. Some of the courses seem to be somewhat of a combination of these two.

"Conference" type courses are given regularly in 21 states and are under consideration in 6 additional states. In most instances they are held annually for a period of 3 days. In a few states the courses are conducted on a regional or sectional basis or over a more extended period of time.

Approximately half of these "conference" courses are designed to give instruction to both water and sewage treatment plant operators at the same time. They are designated as "conferences" in 7 states; as "courses" in 5 states; and as "schools" in 9 states. As a general rule the engineering division of the state health department and some university within the state coöperate in sponsoring and conducting such courses, with water works associations and organizations representing municipalities listed as coöperating agencies in a number of instances. The first course of this kind appears to have been established in Texas in 1918. Since that time there has been a gradual increase in the number of such courses developed, with considerable activity in this direction at the present time.

In about half of these "conference" courses, the instruction is arranged to cover the more elementary fundamentals of water works practice, with considerable repetition of subject matter from

year to year. In the others, the programs are arranged more in the fashion of water works association programs and include a variety of miscellaneous subjects. In 4 states, examinations are given at the conclusion of the courses. For satisfactory completion, certificates are awarded in 4 states. Certificates of attendance are awarded in 10 states. In 3 states, satisfactory completion leads to or aids the operator in obtaining a license or approval of his qualifications as a water treatment plant operator in a specified class or grade.

Short courses of the "laboratory" type are conducted in 9 states and are under consideration in 4 additional states. Such a course formerly given in West Virginia has been discontinued in favor of a correspondence course conducted by the State Health Department. For the most part such courses are given annually. They are held for varying periods ranging from 3 days to 2 weeks. They are designated as "courses" in 6 states and as "schools" in 3 states. In most instances the courses are conducted jointly by some university and the state health department. Examinations are given at the conclusion of the courses in 2 states. Certificates of completion are awarded in 4 states and certificates of attendance in 4 others.

In 3 of these "laboratory" type courses the level of the instruction and course requirements are regarded as sufficiently high so that operators who are successful in passing are looked upon as competent or qualified operators. In New York satisfactory completion of the course meets one of the qualifying requirements for Grade II operators.

The data indicate that out of a total of 112 men registered in such courses, 16 possessed college degrees, 11 had some college training, 33 were high school graduates, 23 had some high school training, and 29 had only common or grade school training. In New York it has been the experience that persons with only a high school education have considerable difficulty in passing the courses.

Practically all of the state sanitary engineers reporting were agreed that short courses of both types were meeting a definite need and fulfilling a useful purpose, and that participation of state health departments in this type of operator-training program was thoroughly justified. General agreement was expressed in the replies that such courses had definitely contributed to improved operation of water supplies, were making better operators out of existing operators, and had served to promote understanding and relationship between local municipalities and state health departments. There was general agreement too that such courses did not in any way interfere with the objective of getting well trained men placed in positions, but on the contrary served to impress local appointing officials with the idea that the positions of operator or superintendent require special abilities and talents including specialized training that is not to be found ordinarily in men who clamor for appointment and whose only claim thereto may rest in some political obligation.

In about half of the states in which such short courses are given, there was reported to be a definite and encouraging trend toward the appointment of college trained personnel to operator and superintendent positions, although in several states this trend was stated to be noticeable only in the case of the larger cities. A number of the state sanitary engineers expressed the opinion that this trend had been favorably influenced indirectly through operation of the short courses. Several replies emphasized that many communities were so small that at this time, they could not be expected to employ college trained engineers in their water departments, and that until some licensing

system is placed in operation there could be only a very slow improvement in this situation.

Among the more important suggestions made for expansion of these courses were the development of separate courses for operators of various types of supplies, the development of the courses on a regional or sectional basis, making the courses preliminary to more advanced instruction, and conducting such courses at least annually.

None of the state sanitary engineers seemed to feel that operation of short courses was in any way placing incompetent or poorly trained operators in competition with graduate sanitary engineers or chemists for positions, or that abolishment of short courses would in any way encourage the trend toward placement of college trained men in water departments.

There were a few engineers and university professors, however, who expressed decidedly opposite views or who felt that health departments and universities should get out of the short course business as soon as possible.

No one seemed to condemn conferences or meetings of water works operators or the mutual exchange of ideas and experiences among them, but the benefits of such gatherings were readily admitted. In relation to courses of the "conference" type the principal objections expressed by some were that science was being prostituted considerably by designating them as "courses" or "schools," that universities were making a mistake by associating themselves with their operation as such, and that it was a mistake to award operators' certificates of qualification or attendance because of the false impression which they create that the holders have successfully completed a course of instruction and have received therefor a certificate which by some persons may be construed as something equivalent to a college diploma.

Among the opposing opinions advanced was the thought that while health departments may be justified under present circumstances in attempting to train operators through the medium of short courses or short schools, such schools in reality were based upon a fallacy, should be considered only as a temporary stop gap and not carried or extended any further, and efforts concentrated on some licensing procedure to bring about the appointment of operators and superintendents with proper qualifications and training for their positions, so that as soon as possible such gatherings could be converted into conferences of competent operators who will always profit by meeting together and exchanging ideas and experiences.

A few university professors doubted if such courses had contributed anything of consequence to improved operation of water supplies, objected to such courses being labelled as "schools," felt that universities should not be associated with them, believed that such courses did seriously interfere with the placement of engineering graduates in technical water department positions, advocated their discontinuance on the grounds of this interference and for the reason that they are based on the fallacy of attempting to train men for positions requiring expert skill and knowledge far beyond the average existing operator's ability to acquire or comprehend because of the lack of a proper background of education and training.

The thought was definitely expressed in a few of the replies that to a considerable extent, poorly trained or subqualified operators were being perpetuated in their positions through local prestige obtained as a result of attending such short courses and securing some kind of certificate which they promptly displayed as evidence of their recognition as experts in the water works field. One

sounded the warning that those who are active in sponsoring short courses of either type should take care lest the position of water superintendent or plant operator become permanently associated with personnel of inferior training and education.

It is apparent, however, that on the basis of data furnished to the committee, the above opposing opinion represents a minority opinion and that for the most part health departments and university personnel do not view the operation of short courses in any such unfavorable light.

The dangers in the operation of short courses to which a few of the replies pointed seem to be recognized generally by those associated with their conductance. For the most part such courses are serving only the more intelligent and responsible operators who have the capacity to improve upon their knowledge and abilities and to become better operators. These courses, and particularly those of the " laboratory " type, do not reach to any great extent the large group of operators who perhaps stand most in need of training or replacement by more competent men. In most of the " conference " type courses or schools attendance is largely by the more experienced operators who repeat attendance from year to year.

In most of the states it appears in relation to any of the operator training programs which are being carried on that eyes are being focused on the ultimate objectives of raising the general qualification level of water works personnel and securing the appointment of qualified men to operator and superintendent positions. In some states progress toward these objectives has been very much accelerated by the adoption of some system of licensing. Educational efforts in this direction are being applied continually and in many divers ways. In some states the various operator training programs, including the short schools, have been construed as important preliminary steps toward the establishment of a state operators licensing act which is recognized as desirable in most states, as perhaps the ultimate solution to the general problem.

SUMMARY AND CONCLUSIONS

The important findings and your committee's conclusions in relation to the subject of our investigation may be briefly stated as follows:

1. The appointment of qualified personnel to positions involving responsibility over safety of water supplies is recognized as an outstanding and the ultimate objective toward which all possible efforts should be applied.

2. There is no significant difference of opinion among those with whom the committee corresponded as to this objective, although there are some divergent views with respect to the methods of approach, and with respect to the attributes which define a competent or qualified operator or superintendent.

3. State sanitary engineers and university professors who have associated themselves with any of the various training programs have done so for the most part with their eyes focused upon the ultimate objective and in the belief that such efforts are making for a quicker approach to the ultimate objective. In this sense, all efforts at the training of existing operators may be regarded as a temporary " stop-gap " which can be discontinued or greatly diminished as the general qualification level of operators and superintendents is raised sufficiently.

4. No particular adverse criticism was found to exist in regard to the efforts which state health departments are making to improve the competency or ability of local operators and superintendents through training activities carried on directly at the times of water supply inspections or by means of special visits to plants; but on the contrary, wide approval of such practice appears to exist.

5. The view is taken generally that short courses, correspondence courses, and other " in-service " training programs for water operators concerning which some objections have been raised represent only some extension of the type of training provided by health departments and concerning which no particular criticism was found to exist.

6. It is the prevailing opinion that

short courses are contributing to improved operation of water supplies, to improved relationships between state health and local authorities, are meeting a definite need and fulfilling a useful purpose, and are thoroughly justified under present circumstances.

7. The development of some licensing or civil service procedures together with educational efforts are being regarded generally as the means toward the end, of raising the qualification level of operators and superintendents. Those who object to short courses appear to do so to some extent on the grounds that such short courses interfere with progress toward the desirable ultimate objective and believe that efforts should be concentrated upon establishing some kind of licensing procedure. Those who look with favor upon short courses appear to believe sincerely that their operation, all factors considered, is contributing to progress toward the ultimate objective, and toward the establishment of a licensing procedure and education of appointing officials as to the need for appointing qualified persons to responsible technical positions.

8. There are some engineers and university professors who object to short courses primarily on the grounds that they are conducted under false pretenses and they point to several possible dangers in this respect. Those who look with favor upon the operation of short courses seem to have recognized the possibility of such dangers and for the most part to have taken cognizance of these dangers in sponsoring and conducting such courses.

9. It is the prevailing and majority opinion that all of the different kinds of training programs for water works operators and superintendents, including short courses over which there is some controversy, are justified under present circumstances, and as long as the possible dangers are recognized, may be operated safely in the interest of rather than interference with the broad objective already stated.

10. Your committee concurs in general with the majority opinion as expressed above.

A. F. DAPPERT, *Chairman*
E. SHERMAN CHASE
H. M. FREEBURN
ARTHUR E. GORMAN
R. F. GOUDEY
H. S. HUTTON

Analyzing Frozen Desserts

Food and Nutrition Section

THE work of the committee this year has been very productive. After 2 years of preliminary work, during which time details of organization and procedure were completed, visible results are apparent.

Referee M. E. Parker, in collaboration with his Associate Referees, B. E. Proctor and E. C. Thompson, has prepared methods for the testing of sediment in frozen desserts and their ingredients. They have formulated methods for testing the sediment in all types of frozen desserts as well as the products used in their manufacture, including milk products such as cream, butter, condensed and powdered milk, fruits, nuts, stabilizers, eggs or egg yolks, fresh or frozen, syrups, coloring and flavoring materials. They have also included a comprehensive definition of sediment which should be of value to control officials in public health work. These methods entitled "Sediment Testing of Frozen Desserts and Ingredients" are ready for distribution in mimeographed form.

Dr. J. H. Shrader has done a fine piece of work during the past year as Referee for the "Chemical Analysis of Frozen Desserts and Ingredients." In many respects this is the most difficult assignment of all. In some instances it is necessary to work out new methods or adapt old ones in order to obtain the complete chemical picture desired. Under the direction of Dr. Shrader, W. H. Martin, Associate Referee, has prepared "Rapid Methods for the Determination of Butter Fat in Frozen Desserts" which includes a method for vanilla and one for chocolate ice cream. Associate Referee F. Leslie Hart has ready for submission to the committee a proposed method for the "Detection of Stabilizers in Ice Cream." There has been a great need for such a method for some time and laboratory workers will gladly avail themselves of a quick and accurate procedure.

Other studies that are under way are those by Associate Referee George Jaggard, who is working on the phosphatase test as applied to ice cream. So far no modification of the phosphatase test has been found which is as specific for ice cream as it is for milk. The results vary according to the intensity of the heat treatment. Dr. Shrader feels that before a satisfactory test can be developed it will be necessary for sanitarians and bacteriologists to agree upon a satisfactory temperature—time combination for ice cream such as has been done in the case of milk. Associate Referee P. H. Tracy has just submitted a method for preparing samples of frozen desserts containing solid particles for analysis. There has been considerable variation in the way different laboratories prepared samples of frozen desserts containing solid particles, such as fruit and nuts, for analysis. Some strained the solid material out while others allowed it to remain in the sample. A standard procedure will be of great value in obtaining uniformity of results.

A method for determining the milk solids in frozen desserts has not

progressed very far as yet. There is a very great need of such a method in view of the fact that many cities and states are establishing laws embodying such standards. Likewise not much progress has been made on methods for determining acidity in frozen desserts. Doubtless it will be possible to report on these two last named projects by another year.

The microbiological examination of the ingredients of frozen desserts has progressed satisfactorily during the past year. Referee F. W. Fabian, in collaboration with Associate Referees, has prepared microbiological methods for the following ingredients.

1. The Microbiological Examination of Sweetening Agents, Sucrose (beet and cane), Lactose, Cerelose, Invert Syrup, Liquid Sugar and Honey, by Associate Referee Harlow H. Hall.
2. Determination of the Number of Microorganisms in Powdered Milk, by Associate Referee Paul S. Prickett.
3. Microbiological Analysis of Evaporated and Condensed Milk, by Associate Referee P. A. Downs.
4. Microbiological Analysis of Coloring Solutions, Flavoring Extracts, Fruits and Nuts, by Associate Referee M. J. Prucha.

All of the above methods will be obtainable in mimeographed form shortly after the Annual Meeting. Likewise a method for the microbiological examination of all type of eggs such as fresh, frozen, dried, sugar and salt eggs is now in preparation and will be available within a short time.

Members of the Food and Nutrition Section should know that the Frozen Desserts Committee is a joint committee composed of 3 members from the Laboratory Section and 3 members from this Section. This is a very excellent as well as happy arrangement. Both sections have a fundamental interest in the preparation of standard methods affecting such a large group of food products. The 6 committee members constitute the Referees. The Associate Referees are chosen from any Section of the Association or from without the Association. A complete list of the committee personnel will be found in this issue of the *Year Book* as well as the report of Dr. F. L. Mickle, Chairman of the Joint Committee.

If it is the pleasure of this Section, it is respectfully requested that the present committee be continued intact so that they may complete the work which they have started. As soon as the present proposed methods have been distributed to interested parties and we have received their suggestions and criticisms, they will be edited in the light of these suggestions and criticisms after which they will be published either as a part of *Standard Methods for the Examination of Dairy Products* or as a separate book.

F. W. FABIAN, *Chairman*
J. H. SHRADER
M. E. PARKER

Public Health Aspects of Frozen Foods with Particular Reference to the Products Frozen in Cold Storage Lockers and Farm Freezers*

Food and Nutrition Section

BOTH the frozen food industry and the practice of freezing of foods in lockers by farmers and residents of rural communities have grown very rapidly during the past decade. The use of cold storage lockers has spread particularly rapidly. Nearly 3,000 cold storages are now renting lockers and the expansion in this field shows no signs of slacking. In Iowa alone there are more than 350 such cold storage locker plants. Now a number of manufacturers of refrigeration equipment are commencing to make small freezers which may be used for the freezing and storing of foods on the farm.

In view of the extremely rapid growth of the frozen food locker industry and the possible hazards in the general use of freezers on farms where no supervision or control of sanitation and methods of preparation may be practicable, a consideration of the basic principles of freezing preservation and of the sanitary precautions which should be followed in the preparation of foods for freezing has been undertaken by this committee.

TYPES OF COLD STORAGE LOCKER PLANTS

Cold storage locker plants are of many types, and in many instances offer many different kinds of service. The simplest type, and almost the only kind operating in New York State, offers no service other than cold storage. The customer places the foods (meats, poultry, fruits and vegetables) to be frozen directly in the locker, allows them to freeze, and to remain therein until desired for use, often for a period of several months. A better arrangement, which is common in the Middle and Far West, is one in which the locker operator maintains a sharp freezer (a room held at 0° to —10° F.) in which the foods are frozen prior to placement in the lockers. Many locker plants of this type offer butchering, meat cutting, packaging, freezing, and also in some instances meat curing service. A few also offer to freeze fruits and vegetables for their customers. Many of the locker operators have found it necessary to supplement the income received from rentals and services by selling frozen fish, shellfish, poultry, meat, fruits, and vegetables. Some are also freezing fruits and vegetables in a small way and selling these products both at retail and wholesale. Many locker operators employing butchers buy livestock, butcher it, and sell the meat both fresh and frozen to locker renters and others.

Many of the locker plants are in well constructed buildings, especially built for the purpose. At present, most

* Report of the Committee on Foods (Except Milk).

of these specially constructed plants are nearly new and are kept in first-class sanitary condition. Most of the operators are anxious to make a good impression on the public, and so are keeping their plants remarkably clean.

In general, except for the fact that many of the storage rooms are not kept at a low enough temperature, the newer types of locker plants are adequate in all regards.

As has been pointed out, some of the lockers are in commercial cold storage warehouses or in ice plants. This additional business has been a great help to many ice plants which have been in financial straits because of the great decline in the ice business caused by the general adoption of electric refrigerators. Most of these ice plants are old and consequently hard to keep clean; and in some instances, are not kept in as good sanitary condition as they should be. However, they usually have a great reserve of refrigeration, and are capable of maintaining very low temperatures. Further, the operator usually appreciates the importance of keeping the locker room at a uniformly low temperature.

FARM FREEZERS

A large number of types of farm freezers are being tried out. These vary all the way from rather large " walk in " freezers to refrigerated cabinets[1] as small as 2½′ x 2½′ x 7′. The larger types are being installed on ranches, and on large farms operating a roadside stand business. Many of the " walk in " types of freezers have an outer room, maintained at a little above freezing, which is used for cool storage of fresh fruits, vegetables, and dairy products.

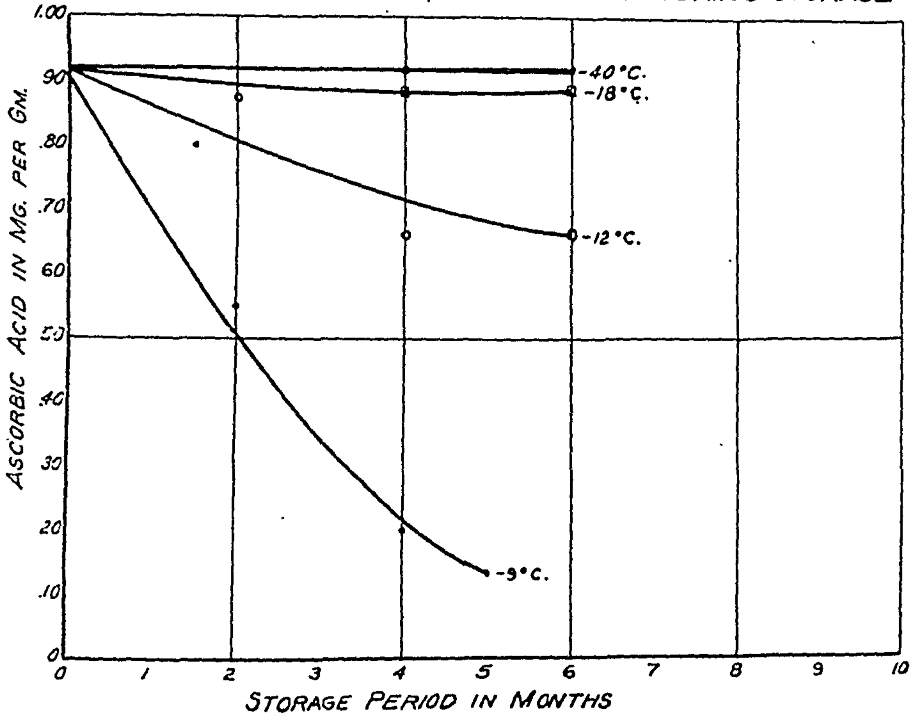
The cabinet type is the size which appeals to the ordinary farmer. The simplest type[1] of cabinet consists of a rectangular insulated box maintained at approximately 0° F. by means of a small refrigeration unit. This type has the disadvantage that when products to be frozen are placed in the cabinet, in which previously frozen foods are stored, the frozen products may thaw partially while the fresh foods are being frozen. In some cabinets this condition is avoided by having two separate compartments, one for freezing and another for storage. Usually a somewhat lower temperature is maintained in the freezing compartment than in the section in which the products are stored. Some two-compartment cabinets have been constructed in which forced air circulation is provided in the freezing compartment. This materially increases the rate of freezing and insures a uniform temperature throughout the freezing compartment, provided the products are not solidly packed in the freezer. Another type of freezer has one or more refrigerated metal plates on which the products are placed for freezing. The chief objection to this type is that the quantity of food that can be frozen at one time is small.

GENERAL PRINCIPLES

Meat and Poultry—It is generally recognized that, other conditions being equal, the more rapidly meats and poultry are frozen, the more palatable the product. As long ago as 1916, Plank, Ehrenbaum, and Reuter[2] indicated the advantages of rapidly freezing fish. Since then, others[3, 4] have shown that " quick freezing " has similar advantages in the case of meat and poultry. When frozen in the usual locker storage sharp freezer, which is usually maintained at from 0° to —10° F., foods can hardly be said to be " quick frozen." When meat which has been frozen in this way is thawed, some leakage results, the amount depending upon the temperature of freezing, the kind of meat, the size of the piece, the rate of air circulation, and certain other factors. The ready acceptance of locker storage by the public indicates that in general the rural public is satisfied with the

FIGURE 1

LOSS OF ASCORBIC ACID IN FROZEN BROCCOLI DURING STORAGE



quality of slow frozen meat, even though it is not entirely the equivalent of fresh or quick frozen meat.

Research work conducted in the Chemical Laboratory of the New York State (Geneva) Agricultural Experiment Station [5] has shown very clearly that, other considerations being the same, the higher the storage temperature, the more rapidly rancidity develops in frozen meat. Furthermore, pork turns rancid more rapidly than beef. Thus, frozen pork can be kept in good condition at 15° F. for only 2 months; at 10° F. it keeps free from rancidity for about 3 months, and becomes very rancid shortly thereafter; at 0° F. pork will keep free from rancidity for at least 8 months.

Fluctuating temperatures in cold storages where meat and poultry are maintained cause a rapid deterioration of the quality of the products, because the fluctuations speed up desiccation. They also accelerate crystal growth in the frozen product and consequently increase leakage when the product is thawed.

Another point which should be indicated is that in order to reduce desiccation all foods must be packed in moisture-vapor-proof containers or wrappers before being frozen. The fats of desiccated meats turn rancid much more quickly than those of meats not subject to desiccation.

The prevention of development of rancidity in fatty meats, especially in liver and other organs which are relatively high in vitamin A, is of importance both from the standpoint of palatability and public health. Lease, Lease, Weber, and Steenbock [6] have shown that vitamin A is very rapidly lost from rancid fats. Thus it appears that frozen liver stored at high temperatures (e.g., 10° to 15° F.) would slowly lose vitamin A.

Fruits—Rapid freezing is not as important in the case of fruits as in the case of meats and poultry. If fruits of the proper variety and maturity are

properly prepared and packaged in small containers, they may be sharp frozen and products of excellent quality obtained.

In general, fruits should be prepared as for the table, then mixed with sugar or covered with a heavy sugar syrup. If sugar or syrup is not added, the product will be much less palatable, but it will not be materially less wholesome.

Storage of frozen fruits at high temperatures, e.g., +10° to +15° F., results in a slow loss of quality (color, flavor and vitamin C); but even after a year's storage, the product will still be edible, provided it was packed with sugar or syrup.

Vegetables — All vegetables require special treatment prior to packaging. This treatment involves, in addition to the usual sorting, cleaning, and washing processes, blanching (scalding) in order to inactivate enzymes. This treatment must be sufficiently severe to raise all parts of the vegetable to 180° F. or higher. During storage, unblanched vegetables not only develop undesirable flavors but also lose a considerable proportion of their vitamin C, unless held at very low temperatures (e.g., —40° F.).

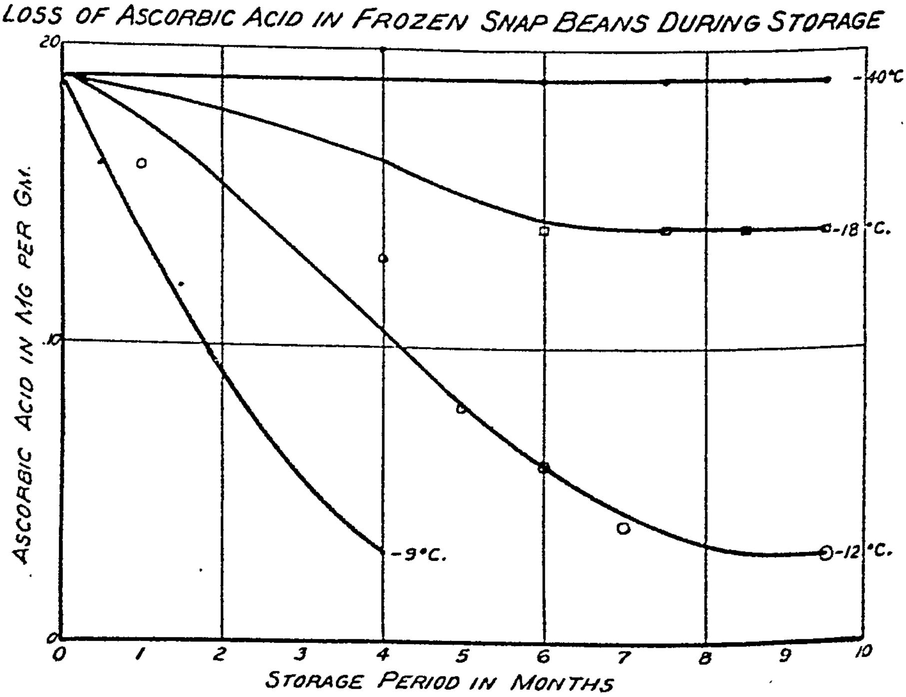
Even properly blanched vegetables gradually lose their vitamin C content at temperatures above 0° F. Snap beans and spinach require even lower temperatures[7] if they are to retain high vitamin C potency for longer than 4 months.

EFFECT OF FREEZING ON MICRO-ORGANISMS

Freezing causes a remarkable destruction of the microörganisms of fruits and fruit juices.[8, 9] However, with the possible exception of the more acid fruit juices, sterilization is not effected. Freezing of meats, fish, shellfish, poultry, and vegetables usually causes a destruction of a portion of the microorganisms, often killing half of the total number present.[10–13] However, since freezing does not sterilize foods, and since the thawed products are usually more prone to spoilage than similar

FIGURE 2

LOSS OF ASCORBIC ACID IN FROZEN SNAP BEANS DURING STORAGE



products which have not been frozen, the same or greater care should be taken in handling foods prior to freezing as is given in handling similar foods which are consumed without freezing and storage.

NEED FOR CARE IN THE SELECTION, HANDLING, FREEZING, AND STORAGE OF FOODS

From the foregoing consideration of the principles of preparation, freezing, and storage of foods, it is evident that the freezing of foods is not so simple a matter as most persons believe. Further, it is clear that great care should be taken in the handling of foods to be frozen.

Regulations designed to license cold storage locker plants should be put in effect. These regulations should not only provide for periodic health examination for employees handling food and for the examination of the sanitary condition of the plant, but should also require that the foods be frozen under conditions which will insure moderately fast freezing, and that the frozen products be maintained at a uniform temperature not higher than +5° F., and preferably 0° F. at all times. At such temperatures, practically all foods can be kept in excellent condition for at least 8 months if they have been properly prepared and packaged.

The only state law requiring the licensing of refrigerated locker plants is that passed in Iowa [14] in the spring of 1939. This law calls for the inspection of the sanitary conditions of all proposed plants prior to the issuing of the license. It also provides that—

> Every refrigerated locker plant shall be maintained in a sanitary condition and conducted with strict regard to the influence of such conditions upon the food handled therein and any licensee under this chapter who fails to comply therewith shall suffer a revocation of his license.

All foods are required to be sharp frozen (in a room maintained at 0° F. or below) prior to being put in a locker. Further, there is the rather general provision:

> No article of food shall be stored in any refrigerated locker unless it is in a proper condition for storage and meets all of the requirements of the pure food and food sanitation laws and such rules as may be established by the department for the sanitary preparation of food products which are to be stored.

These regulations are all very good and if enforced would seem to be adequate to control sanitation in the plants. It would be well, however, to add a paragraph requiring periodic health examinations for locker employees actually engaged in handling of foods.

There is one provision of this law that is entirely inadequate; it is the section specifying the temperature at which the lockers be maintained. This requires that the food in the lockers "be kept at a temperature of 12° to 15° F. during the period it is kept therein." As has already been pointed out, the fat of pork and other meats turns rancid quickly at this temperature; further, fruits and vegetables lose their bright colors, fine flavors, and vitamin C content rapidly. The temperature specified should be preferably 0° F. and in any case not higher than +5° F.

Since farm freezers are being installed in farm homes, it is difficult to see how their operation can be regulated by legislation. Probably the best way to insure proper construction of these freezers and the use of correct procedures in preparing, freezing, and storing foods will be to disseminate widely information concerning the basic principles of the freezing preservation of the foods. The companies building farm freezers can be relied upon to design and construct equipment on basically sound engineering principles. These companies may be counted on to co-

operate with agricultural extension workers in passing on to the users of farm freezers any information which may be available on methods of preparing, freezing, and storing meats, poultry, fruits, vegetables, and other foods. The agricultural experiment station workers and others who may have special knowledge of food freezing should make this information immediately available to those in need of it. Unsolved problems,[5] such as whether or not aging of meat to be frozen in farm freezers is beneficial, should be studied. This problem and many others connected with the use of farm freezers are being investigated at the New York State (Geneva) Agricultural Experiment Station, and certain other institutions.

ADVANTAGES TO BE DERIVED FROM THE MORE GENERAL USE OF LOW TEMPERATURE REFRIGERATION

From the foregoing consideration, one might conclude that the freezing of foods in locker storages and on farms involves many difficulties and hazards and consequently should be discouraged. This is not true, since the benefits far outweigh the possible difficulties. Residents of rural regions, who freeze their foods either in lockers or in farm freezers, will have a much more varied, less monotonous and better balanced diet than they have had heretofore. In many cases they will preserve foods from their own gardens and orchards which would otherwise go to waste. If low storage temperatures are maintained in the freezers, the products will, on the average, be richer in vitamin C and other easily oxidizable vitamins than would be the case had they been preserved in some other way. In many rural sections of the country malnutrition is prevalent during the winter and early spring months. In Aroostook County, Me., for instance, a survey of the health of the people of that area indicated that in the late winter, many persons were suffering from mild cases of scurvy. The general use of freezing preservation for vegetables and fruits would increase the vitamin C content of the average diet and reduce the prevalence of this dietary deficiency disease.

Freezing preservation, at the temperatures commonly employed in cold storage lockers and farm freezers, kills trichinosis organisms.[15] Thus when frozen pork is eaten, the danger of contracting trichinosis is entirely eliminated.*

In conclusion then, it may be said that, while freezing preservation is not as simple a method of preserving foodstuffs as many think, and while there are hazards which may be encountered because of carelessness in preparing and freezing easily perishable foods such as vegetables, yet the extended use of freezing preservation in rural regions will result in better nutrition of the people of those areas.

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* The U. S. Bureau of Animal Industry states that pork which has been stored for 20 days at + 5° F. is safe, provided it is frozen in layers not exceeding 6 inches in depth.

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Sanitary Aspects of Packaging Milk and Milk Products*

Food and Nutrition Section

THE packaging of food products is of great significance to the public health. The sanitary aspects of packaging foodstuffs should receive more attention on the part of sanitarians and health workers than it has received in the past. As regards dairy products, the attention of sanitarians has for some time been directed toward the sanitary control of the production and processing of these products. Obviously the use of a clean container which protects dairy products from processing plant to consumer is essential lest the benefits of careful production and pasteurization be largely nullified.

The situation in regard to packaging dairy products has improved markedly in recent years. The sale of "loose" milk and cream has been almost entirely eliminated in our cities and towns for many years, and the factory filled single-service package is being used to a greater extent each year for such products as butter, ice cream, and cheese.

CARE OF MILK AND CREAM CONTAINERS

Since milk and cream usually reach the consumer in glass bottles, the washing of the returned bottles is one of the most important operations in a milk plant. All the bottles returned from the routes, whether clean or dirty, have been exposed to contamination. Bottle washing, therefore, involves sterilizing as well as cleaning. The bottle washers now in common use wash, sterilize, and cool the bottles so that they can be passed automatically to the bottle filling machines without rehandling.

Caustic soda is the main alkali used in bottle washers. Myers[1] demonstrated that caustic soda is very effective as a sterilizing agent; its solutions have a high pH, high buffer index, and high osmotic pressure. Myers concluded that a 5 minute exposure at 140° F. at a pH of 12.0 provides an ample margin of safety. The concentrations used commercially of 1 to 3 per cent alkali are adequate for effective sterilization.

Although caustic soda is the main alkali used, other compounds such as sodium carbonate, sodium metasilicate, and trisodium phosphate are also used. The primary use for these salts is that they enhance rinsing properties. While caustic soda is the choice for the soaker compartment, in the preliminary rinse it is necessary either to use softened water or a softening compound such as trisodium phosphate.

Before the bottles are discharged from the washer and have been thoroughly rinsed of alkali or caustic soda, they are submitted to a chlorine wash. Scales[2] has demonstrated that alkyl aryl sulfonate is a very effective rinsing agent, and when the chlorine solution alone fails to produce a sterile condition the addition of 0.25 per cent of

* Report of the Committee on Milk and Dairy Products.

alkyl aryl sulfonate to it will give sterility in 3 minutes, even with solutions containing only 2.0 p.p.m. of available chlorine. The potentialities of alkyl aryl sulfonate as a final spray for cans as well as bottles is being investigated.

Many milk sanitarians set a bacterial content of 100 as a maximum for "washed and sterilized" milk bottles. According to Mott,[3] modern bottle washers functioning satisfactorily and supervised properly will consistently turn out bottles which contain less than 100 bacterial colonies per bottle.

Milk cans, however, cannot be subjected to an alkali so strong as caustic soda, which would rapidly dissolve the tin plate from the can. Milk and cream cans are, therefore, usually washed in a solution of alkaline salts as soda ash and trisodium phosphate. Such a solution is also satisfactory for bottle washing in small-scale hand operations such as are encountered in producer-distributor operations. The hydroxyl-ion concentration of washing solutions of soda ash or trisodium phosphate is not sufficient for effective sterilization. Under these conditions the sterilization of cans and bottles often is accomplished by hot water rinses or by steam sterilization.

Light weight, small mouthed glass bottles have increased in use. Considerable work has been done on the pouring lip of bottles of varying mouth width. It is apparent that the ability of any closure to protect the pouring lip is dependent on the type of cap and the contour of the bottle. The ordinary paste board disc cap is still widely used as a closure although the rapidly increasing use of a second cap which entirely covers the pouring lip indicates a trend to added safety.

The large 2 and 4 quart milk bottles now in use in many localities present special sanitary problems in washing, filling, and capping. The equipment now installed in the majority of dairies will not handle these big bottles.

SANITARY CONDITION OF PAPER MILK BOTTLES

Although paper bottles have been available for a considerable length of time, only in recent years has the dairy industry begun to use them in increasing quantities. A number of sanitarians have exhibited considerable interest in the single service paper milk bottle, which has been referred to in glowing terms by some as the perfect container for milk. The literature is replete with recent references devoted to the paper container and its advantages and disadvantages. To advocate the use of either glass or paper bottles is not one of the objects of this report. However, a reasonable conclusion to draw is that the question is largely economic; the paper container will be more widely accepted if savings result from its use.

Where paper containers are purchased ready made, proper precautions against contamination during handling must be exercised, as the chance for contamination is undoubtedly greater than in the case of glass bottles which go directly from the washing operation to the filler without rehandling. Handling of paper containers has been eliminated in one type of equipment which fabricates the bottles from paper stock and automatically fills them. Some paper containers are so constructed that outside contamination can enter the milk as the milk is poured from the bottle. Furthermore, the shape of the container in some instances is such that covering the "pouring lip" is very difficult.

The increased use of paper milk containers has instigated the development of methods to insure their sanitary quality. Companies manufacturing paper containers have taken the lead in this matter by establishing an Institute[4] at the New York State Agricultural Experiment Station for the purpose of studying the sanitary condition of paper stock used for milk containers. This institute has given consideration to the

principles of sanitation which should govern the production and handling of paper containers. The recommendations to date are briefly:

1. Use of virgin pulp only
2. Pure process water and strict microbiological control of pulp and paper mills
3. Suitable protection and wrapping of finished board
4. Mechanical handling of board and containers at conversion factories and milk plants
5. Protection of board, adhesives, moisture-proofing materials, and finished containers from careless exposure to human contact, contamination, dirt, flushing water or insects
6. Detailed knowledge and careful selection of all materials composing the container to avoid the possibility of incorporating substances having germicidal or bacteriostatic effects, the use of which is prohibited unless they have been shown to be non-toxic to human beings and without effect on milk

At the Geneva Conference, 1938,[5] it was suggested that: "Board prior to moisture-proofing shall not, at any time, exceed 500 colonies per gram of disintegrated board."

"The average bacterial content of finished containers should not exceed 50 colonies per container."

These standards are lenient and workers in this field [4, 6, 7] have shown that the average container on the market will meet them easily.

PACKAGING OF OTHER DAIRY PRODUCTS

Ice Cream—A number of bacteriologists have stressed the danger of contaminating bulk ice cream during dispensing. The factory-filled package has been advocated as a means of avoiding this danger. The increased use of the single service container for ice cream has already been mentioned in the report.

Paper cups, bags, and boxes used for ice cream are invariably bought ready made. They should be protected during handling and storage so as to avoid as much as possible chances for contamination. However, bulk containers are frequently formed in the ice cream plant. Wherever possible separate rooms should be provided for the storage of packages and the forming of bulk containers. Containers should be assembled in such a manner that it is unnecessary for the operator to place his hands within them. It is common practice, especially for one type of container, for the operator to place his hand directly into the package in order to insert the bottom.

The production and packaging of frozen stick novelties has been a phase of the business which has grown rapidly in recent years. These novelties, especially in small scale production, may be handled several times. Unless proper precautions are observed, opportunities for contamination exist. At present equipment is available which precludes hand contamination of stick novelties.

A problem also exists in the packaging of bulk ice cream from continuous freezers. Where conveyors are used to place the packages in position for filling, covers for the containers should be put in place by machinery in much the same way as is done in capping milk bottles.

Considerable progress has been made in the type of equipment used for making fancy forms. Paper molds have been developed to replace pewter or lead molds for individual forms, paper brick molds are in use where the metal forms were once employed, and a new design of mold for stick novelties is available which makes easier the washing and sterilizing of the mold in which this product is frozen.

Evaporated and Condensed Milk—The keeping quality of evaporated milk depends upon the destruction of organisms through sterilization, and that of condensed milk on the combined effects of pasteurization plus the addition of approximately 40 per cent of sugar. The protection of cans against contamination is essential, hence clean tin plate is used for can manufacture and

sanitary precautions are exercised in the manufacturing plants.

Containers used for evaporated milk are usually of the " pin hole " or " vent hole " type, hence the opportunity for contamination is limited. Many evaporated milk plants contain can-making machinery and the cans are led directly from the manufacturing operations to the filling machines. Where cans are bought ready made, sanitary precautions must be observed in shipment and storage until used. After filling and sealing, the cans of evaporated milk are sterilized at approximately 240° F. for a period of about 15 minutes, which process insures against the danger of any possible previous contamination.

In the case of sweetened condensed milk, the cans are generally manufactured at the point of use. Since condensed milk is not sterilized after the can is sealed the cans for sweetened condensed milk are generally sterilized with dry heat before filling. In the bulk storage of condensed milk the use of metal barrels which can easily be cleaned and sterilized before filling is being introduced. These metal barrels replace wood barrels which are less satisfactory from a sanitary standpoint.

The question has been raised frequently as to the probable effect of the container on the lead content of evaporated milk. In 1935 the U. S. Food and Drug Administration reported: " We have not found in fluid or evaporated milk quantities of lead or arsenic which can by any stretch of the Food and Drug Act be regarded as harmful. On the fluid milk basis, the lead averaged about one-fiftieth of the tolerance." The work of Fairhall [8] and Harwood and Turley [9] further substantiates the above statement and shows that the lead content of the product is not increased to any extent by the can or by the sealing of cans with the tin-lead solder.

Butter—In past years much butter has been cut, weighed, and wrapped at the retail store. Fortunately this practice, often insanitary, is rapidly vanishing and factory cut and wrapped butter is being retailed instead. Another undesirable procedure is the hand cutting and wrapping of butter which often was and still is the practice in many creameries. However, marked improvement is observed in a considerable number of instances. Several mechanical butter cutters and wrappers are now available which virtually eliminate hand contact with the butter.

The parchment wrappers, liners, and circles used in packaging butter in tubs or cubes, as well as in retail packages, usually are handled in a sanitary manner. The parchment is practically sterile when received by the creamery. Furthermore, it is common practice to soak the parchment in boiling saturated brine before use in wrapping salted butter, and in boiling water for unsalted butter.[10] This treatment should entirely free the paper from bacteria and molds. The elimination of molds is essential because the parchment is a semi-permeable membrane and mold spores on the outside of the wrapper could eventually work through to the butter.

Recently the addition of sodium benzoate or calcium proprionate to the brine treating solution or their substitution for brine has been suggested.[11] Calcium proprionate is superior to sodium benzoate, possibly because it gives off some proprionic acid, which is volatile, and hence reaches parts of the butter not in contact with the paper. However, the proprionic acid possesses a characteristic volatile aroma foreign to butter. Therefore the use of the calcium proprionate may be of doubtful value. Another development at present is that paper manufacturers are giving thought to the mold-proofing of parchment for butter wrapping.

Cheese—The manufacture and handling of cheese often raises a public

health problem. A large percentage of the hard varieties of cheese, including American Cheddar, is made from raw milk and methods of retailing are not always sanitary. The cutting and wrapping of large cheeses in the retail store is undesirable from a sanitary viewpoint, and also allows for flavor deterioration and fat and moisture loss from the cut cheese. A method[12] has been developed which makes it possible to cure and merchandize American Cheddar cheese in sealed sanitary consumer-size units. Any product that reaches the consumer in an identified package must of necessity be of a fine uniform quality. Therefore cheese that is to be merchandized in a labeled consumer-size package should be made from a good quality of pasteurized milk. Both consumers and manufacturers are becoming interested in a consumer-size sanitary package of American Cheddar cheese.

Process cheese is a product made by grinding, mixing, and blending different lots of cheese with the addition of an emulsifying agent. The water content of the cheese may be regulated by the addition or expulsion of water. After being ground and mixed in the proper proportions, it is pasteurized at a high temperature. While hot it is poured into the foil- or wrapper-lined box forming the package in which the cheese is eventually sold. When the tin-foil is used, the foil is folded over the hot cheese so as to prevent contact between the cheese and the air. In the packaging process, the hot cheese brings the temperature of the wrapper to the pasteurization temperature. Since the cheese cools slowly, the pasteurization temperature is maintained for a time sufficiently long to have a definite value in bacterial destruction. Process cheese in factory-filled packages is being sold in large quantities because of its attractive package and convenience to the housewife.

Soft cheeses are usually packaged in paper cartons, glass jars, or "glassine" bags, which, if properly handled, should be free from contamination.

SUMMARY

From this brief review of the sanitary aspects of the packaging of milk and milk products it is obvious that problems of sanitation still exist. This is especially the case with butter, cheese, and ice cream. These products may be packed in bulk and dispensed by the retailer under conditions which frequently are not good sanitary practice. That progress is being made and the situation is hopeful has been shown. The members of this committee urge that sanitarians and foods workers in general give the problem of the sanitary packaging of milk and milk products the attention it deserves.

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Ventilation and Atmospheric Pollution

Industrial Hygiene Section

Part I

Suggested Standards

THE reader is referred to the 15 fundamental standards suggested for air and space environments intended for human occupancy, which have undergone very slight changes only—language rather than content—as published in the previous three annual *Year Books.* No further criticisms or comments concerning these have been received during the past year. While general in nature (with the exception of Item 9, minimum space and cubic footage), they appear to meet the opinions of engineers and physicians.

A non-committee discussion on "City Noise" was submitted by Dr. Carey P. McCord, a member of the committee, and read before the Industrial Hygiene Section of the American Public Health Association at the Pittsburgh Meeting, October 17, 1939.

Comments and criticisms are still invited upon these standards, as they appear in the *Ninth Year Book 1938–1939,* and may be addressed to the chairman or any member of the committee. The committee, which was appointed in 1931 at the Montreal Meeting, retains the same personnel (Philip Drinker, Leonard Greenburg, Emery R. Hayhurst, *Chairman,* William J. McConnell, Carey P. McCord).

Part II

Standard Methods for the Examination of the Air

THIS committee, organized at the Pasadena Meeting in 1934, and representing the Industrial Hygiene, Engineering, and Laboratory Sections, has reported annually in the *Year Book,* chiefly through its four sub-committees, whose reports follow. In addition, it was the desire of the Section on Industrial Hygiene at the Pittsburgh Meeting that attention be called to certain papers by various members of the committee and sub-committees which have a more or less close relation to the committee's work, as follows:

Industrial Hygiene—Retrospect and Prospect. Address of the Chairman of the Section. J. J. Bloomfield

Dust. H. H. Schrenk

Vapors. Philip Drinker

The Control of Dust in Rock Drilling Operations. Leonard Greenburg, Theodore F. Hatch, William J. Burke, and William B. Harris

As heretofore, comments and suggestions are invited and may be taken up with nay member of the committee or sub-committee as befits the subject matter.

EMERY R. HAYHURST, *Chairman*
HARRY B. MELLER *(Engineering Section)*
G. L. A. RUEHLE *(Laboratory Section)*
PHILIP DRINKER
LEONARD GREENBURG
WILLIAM J. MCCONNELL
CAREY P. MCCORD

I. Report of Sub-Committee on Physical Procedures in Air Analysis

THIS committee directs attention to its report in the *Year Book 1938–1939,* entitled " Instruments and Methods for Recording Thermal Factors Affecting Human Comfort," in which very slight changes are recommended as follows: (1) p. 63, 1st column, 2nd complete paragraph, last three lines (referring to the principal environmental factors), in which " mean skin " is substituted for " body surface," so that the last clause shall read: " and the best single index of their combined effects is mean skin temperature "; (2) p. 65, 1st column, paragraph upon " *Radiation in rooms heated by convection methods,*" 2nd sentence—" In an unpublished study, Yaglou found that " to be deleted, and the altered sentence to read: " In ordinary frame or masonry dwelling, office, and school buildings, heated to 69°–75° F. by hot water, steam, or warm air, the mean radiant temperature was *found to be* never more than 2.5° F. below or above air temperature."

The chairman (Professor Yaglou) calls attention to the recent work on radiation effects in ordinary buildings by Ruth C. Partridge and D. L. McLean (Toronto) as published in the *Journal of Industrial Hygiene & Toxicology* (20:482, Sept., 1938), also to the various reports by H. M. Vernon upon this subject.

C. P. YAGLOU, *Chairman*
ALONZO P. KRATZ
C.-E. A. WINSLOW

II. Report of Sub-Committee on Chemical Methods in Air Analysis

Sampling and Sampling Devices

THE sub-committee continues its work this year with a report on sampling and sampling devices. It is intended to keep the list of sampling devices up to date. In addition, it is planned to deal with specific atmospheric contaminants, adding to the list from time to time.

SAMPLING

No treatment of analytical methods is complete without a discussion of sampling. It should be obvious that regardless of refinements and precision, the results of the analysis cannot be more accurate than the sample. Frequently the sample itself is the limiting factor in the determination of contaminants.

The industrial environment is sampled to determine the workers' exposure to toxic materials. This environment presents various degrees of complexity and fluctuation. In addition, the worker does not remain stationary but may be moving about or dividing his time among various activities. On this account there has been considerable confusion concerning the location of sampling point. We must decide whether we are to obtain representative samples of the environment within the plant or whether we are to obtain samples which represent a trail of the individual worker as his activities change from time to time.

A striking example of such complexities was encountered by one of us very recently. Lead samples were being collected in a glass factory. On one day the average exposure for the decorators (spraying operation) was approximately 3 mg. of lead per 10 cu.m. of air. On the next day the concentration had increased to approximately 30 mg. per 10 cu.m. of air. The only difference was the type of ware being sprayed. The need for thoroughness when sampling the industrial environment is here again emphasized.

The environment must be sampled. The worker's exposure may then be obtained by a breakdown of that exposure according to his various activities and weighting these activities according to the time spent in each.[1] It is recommended that samples be collected in at least three general sampling locations.

1. Samples collected in the immediate vicinity of the workers in a particular environment
2. Samples collected near the source of the contaminant entering the general atmosphere
3. Samples of the general workroom atmosphere

It is not always possible to obtain all these types of samples. Nevertheless, whatever type of sample is obtained should be clearly borne in mind so that samples may not be indiscriminately averaged together or unjustifiably compared.

SAMPLING DEVICES

In many cases there is not much choice in the matter of the sampling device to be used, but with the constant development of apparatus, both commercially and in the laboratory, this condition may soon be remedied. Where there is a choice the following considerations obtain. In a constant atmospheric

environment a simple accurate device which gives an immediate reading may be used. As a matter of fact, any device with satisfactory accuracy may be used in this case whether of the "grab" sample type or one that collects a sample over a period of time. In the usual case where the environment is not constant and the concentration of the atmospheric contaminant changes, it is necessary to take a number of samples over a sufficient time interval in order to obtain both an average of the concentrations with time, and the upper and lower limits of the concentrations which occur. With slow sampling devices it is still possible to obtain average samples. The disadvantage lies in the fact that it is difficult to obtain concentration maxima and minima. With fast sampling devices the aim should be to take a greater number of samples at frequent intervals rather than as few samples as possible.

There have been numerous objections to slow sampling devices. Some field men feel that they should be in and out of a plant in the shortest possible time. Although this is a laudable objective, one should not lose sight of the original purpose of entering the plant. The taking of a few unnecessary samples or sampling for an unnecessarily long period may waste a few hours, but if the sampling period or number of samples is too greatly curtailed so that the results do not give the true picture of conditions, the entire time spent in making the study may be wasted.

Portability is another desirable aim in the choice of sampling devices. While it has its undoubted advantages, it is usually not an important enough consideration to cause preference over more efficient but less portable units. There may, of course, be cases where portability is essential. This is true where it is actually impossible to use certain instruments or if immediate results are necessary.

The toxic limits of the atmospheric contaminants to be determined must also be taken into account in so far as the sampling device and sensitivity of the method must be able to cover these concentrations.

It has been suggested in a previous report of this sub-committee that laboratory tests be conducted on sampling devices to determine their efficiencies. Devices with low efficiencies can give only comparative results unless the efficiency is determined and the fluctuations in efficiency are not too wide. Usually, the fluctuations are the greater the lower the efficiency. The following example illustrates the kind of error possible with low efficiency apparatus. If a sampling device should have an efficiency of close to 100 per cent and if throughout its operation that efficiency drops 10 per cent, the analytical results become 10 per cent low. But, if a device has an efficiency of about 20 per cent and if it should drop to 10 per cent, the results are one-half of what they should be.

Using the list of laboratories obtained as described in the 1937–1938 commitee report, letters were sent out to 37 laboratories asking for a list of air sampling devices in their laboratories and for comments. The response was very gratifying and the opportunity is taken to thank all these organizations for their coöperation.

These sampling devices fall into two groups:

GROUP I—Instruments indicating or recording the presence of the contaminant

GROUP II—Absorbing devices which collect the sample in a form in which it can be subsequently determined

We next consider these groups by subdivisions:

GROUP 1-A—Direct Reading Scale Instruments

1. Carbon Monoxide Indicator, M.S.A.

This instrument gives a continuous reading of the carbon monoxide concentration in the air. The sensitivity varies with different

designs, but all types will indicate concentrations well below the danger threshold value.

Eighteen laboratories report the use of this instrument, 12 without comment. Criticisms received: Need of frequent changing of canisters, sensitivity to other contaminants, not reliable with inexperienced operators, inconsistent, meter unreliable, heavy, and hard to keep adjusted. In spite of some of these criticisms we feel that this instrument is not unsatisfactory. We do not know of any contaminants which seriously interfere with its use under usual conditions, and any device should be used by an experienced operator to obtain reliable results.

2. Combustible Gas Indicator (Davis, M.S.A., U.C.C.)

This is a direct reading grab sample instrument. It will determine any combustible gas in high concentrations, but in many cases is not sensitive enough for industrial hygiene purposes. It must be calibrated for each vapor for accurate interpretation of results.

3. Benzol Indicator (M.S.A.)

This is similar to the combustible gas indicator, but more sensitive, reading to 20 p.p.m. of benzol. The air is passed through a drying agent which may tend to remove certain types of organic vapor.

4. Interferometer

Useful for substances of high molecular refraction and relatively low toxicity (*i.e.*, solvents). Nonspecific and takes grab samples. Must be calibrated for each vapor. Used by 4 laboratories. Expensive, and with the Zeiss instrument replacements, must be ordered from Germany.

GROUP 1-B—Test Paper and Other Indicator Absorption Methods

1. British Test Paper Methods

A series of leaflets is being published by the Department of Scientific and Industrial Research, Great Britain, on the rapid detection of a number of toxic gases, and may be obtained through the British Library of Information, 50 Rockefeller Plaza, New York. These methods are qualitative or roughly quantitative, and are not always specific. They do, however, fill a particular need.

a. Hydrogen sulfide. Standard stains on lead acetate paper. Sensitivity 1/150,000. 1/1,000 = 1.52 mg. per liter.

b. Hydrogen cyanide vapor. Standard stains on Congo Red-Silver nitrate paper or benzidine-copper acetate paper. Sensitivity 1/100,000. 1/1,000 = 125 mg. per liter.

c. Sulfur dioxide. Standard stains on starch-iodate-iodide paper. Sensitivity 1/250,000. 1/1,000 = 2.9 mg. per liter.

d. Benzene vapor—Colorimetric. Based on the orange-brown color produced in concentrated sulfuric acid containing a trace of formaldehyde. Sensitivity 1/10,000.

e. Nitrous fumes—Colorimetric. Based on the Griess-Ilosvay reaction. A rose-pink color is produced with naphthylamine and sulfanilic acid in acetic acid. Sensitivity 1/100,000.

2. Mercury Vapor Detector—(a) Nordlander, (b) Lamp Shade

Mercury vapor is determined by its action on a paper sensitized with selenium sulfide. The method is specific for mercury, but slow. The Nordlander apparatus is expensive and requires 1 to 3 hours to get a reading with a low mercury concentration. The lamp shade type is simple, but requires 4 to 8 hours for a reading. It can be left unattended, however. Results are approximate with both instruments, but sufficiently accurate for most purposes.

3. Hydrogen Sulfide Detector, M.S.A.

Takes grab samples. Used by 15 laboratories. Eight make no comment, 2 state it is satisfactory, 1 gives it a qualified approval, while 4 state that its sensitivity is not sufficient for most purposes.

4. Hydrogen Cyanide Detector, M.S.A.

5. Hoolamite Carbon Monoxide Detector, M.S.A.

Both of the above grab sample devices are useful for detecting acute poisoning hazards, but are not sensitive enough to determine concentrations which may be injurious for continuous exposure.

GROUP II—Devices which actually collect samples

1. Gas Washing Bottles

Bottles of the Drechsel, Allihn, Friedrich, Milligan, etc., type may be used to collect certain gases and vapors which are soluble in or react rapidly with the reagent employed.

2. Electric Precipitator (M.S.A.)

This instrument, although expensive and of recent development, is used by several laboratories for the collection of metallic dusts and fumes. It is the only apparatus available with an established high degree of efficiency

for lead (and probably other metallic) fumes. While readily portable, it is not so convenient for actual sampling as the impinger. The high sampling rate—3 c.f.m.—is an advantage.

3. Greenburg-Smith Impinger

The impinger is the standard instrument in this country for the collection of dusts, and is widely used for fumes and mists. A recent study by Littlefield, Feicht, and Schrenk[2] has shown its efficiency for certain types of lead fumes to be low and variable (25 to 60 per cent). The impinger has also been used for readily soluble gases and vapors. It should be borne in mind that the impinger is primarily a dust sampling instrument. In many cases its use is simply a convenience where an ordinary gas washing bottle would serve just as well.

4. Midget Impinger

Not to be recommended for fumes. For toxic dusts the midget impinger is an efficient collecting device, but because of its low sampling rate, approximately 3 liters per minute, the accuracy of the analysis may be less than with the large impinger. For fumes the efficiency is less than with the standard impinger.[2]

5. Fritted Glass Bubblers

In these devices the air passes through porous glass plates and enters the liquid in the form of small bubbles. They can be used for the majority of gases and vapors which are soluble in or react rapidly with the reagent employed. Rates of flow of from ½ to 10 liters per minute are used. For low rates of flow bubblers with small disks of fritted glass are apparently as efficient as those with large disks, but the lower resistance of the larger units is a distinct advantage.

These absorbers are relatively sturdy, but the fritted glass is difficult to rinse out, and when used for gases which form a precipitate with the reagent (*e.g.*, H_2S in $CdCl_2$), the sample cannot readily be transferred to another container. An apron or petticoat type of bubbler often proves satisfactory in this case.

6. Petri Tubes[3]

In these tubes and similar devices the air is merely bubbled through the liquid without special effort to secure intimate mixture of air and liquid. For gases readily absorbed, one or two tubes may be sufficient, but in some cases several may be needed to do the work of a single fritted glass bubbler. These tubes are cheap, readily rinsed, and economical of liquid. Where a vapor is readily soluble in the liquid, but does not combine with it, several Petri tubes in series may be more efficient than a fritted bubbler using the same total amount of liquid.

A modified Petri tube, involving the use of fritted glass, has been found efficient for absorbing benzol in nitrating acid.[4]

7. Multiple Absorbers

To secure the advantage of several absorbers in series, without multiplying the work involved in filling, rinsing, etc., a multiple absorber has been used.[3] This is more convenient than several bubblers in series, but may be somewhat less efficient, due to diffusion of liquid from one cell to another.

8. Glass Bead or Pearl Columns

Where a concentrated solution is needed, an effective method is the use of a column of glass beads wet with the solution. This has been employed by the Bureau of Mines for benzol absorption,[5] and in the Tebbens organic halide combustion apparatus.[6] It is especially useful when a viscous liquid is required.

9. "Lift Pump" Absorber

Nichols has devised an absorber for gases based on the principle of the air lift pump.[7] A high rate of air flow (1 c.f.m.) is used, and a relatively large volume of liquid required. This absorber has been used for SO_2 and Cl_2.

10. Solid Adsorbents

The use of activated charcoal as described by Cook and Coleman for determining organic vapors is a well established method[8] while a similar process employing silica gel has been developed recently by Moskowitz and Burke.[9] Equilibration of the charcoal tubes is laborious and several laboratories indicate a preference for the silica gel method.

Both of these methods determine total organic vapors and require the removal of water vapor and CO_2.

11. Condensation Methods

Vapors and easily liquefied gases are frequently removed by condensation, passing the air through a coil or tube immersed in the cooling medium, dry ice, liquid air, or liquid nitrogen.[10] Vapors difficult to absorb in liquid reagents, such as nitrogen dioxide, and mercury vapor, can sometimes be most effectively determined by this method. The sampling rate is usually not more than 1 liter per minute.

A feature of this method is that the sample

is obtained in a concentrated form. Advantage of this property has been taken by Kay, Silverman, and others,[11] who determine the quantity of organic vapors condensed by measuring the partial pressure of the vapor when the system is brought back to room temperature. By taking large air samples, concentrations of hygienic significance are readily determined.

In general, condensation methods, especially if liquid air temperatures must be reached, are less convenient than liquid reagents in suitable bubblers.

12. Combustion Apparatus

Decomposition of gases and vapors by passage through a red hot tube may yield products which are readily absorbed and determined. The most successful application of this method has been in the case of organic halogen compounds.[6] Sulfur compounds could be similarly determined and in theory any carbon compound, after removal of carbon dioxide from the air, could be converted to carbon dioxide and the latter measured by the usual methods.

Actually, the only other published attempt to adapt this method to industrial hygiene work has been made by Ficklen who designed a carbon monoxide indicator based on this principle.[12] This apparatus has not yet been perfected.

The chief objections to the combustion method are the clumsiness of the apparatus and the fire and burning hazard introduced. Most laboratories use commercially available equipment or have constructed their own.

13. Sample Bottles

These are used when grab samples are satisfactory and when the analytical method is sensitive enough to determine the amount of contaminant present in a small volume of air. When the reaction between the gas and reagent is slow, as with nitric oxide or benzol, this method may be more accurate than the use of continuous sampling devices. The bottle or tube may be filled by aspirating air through, and then adding the reagent, or the reagent may be added first and the bottle evacuated and opened in the atmosphere to be sampled.

Siegel and Burke. in making benzol determinations by the Schrenk method, take the air samples directly in separatory funnels which are used for the analysis.[13]

TESTING THE EFFICIENCY OF SAMPLING DEVICES

Tests should be made of the efficiency of all sampling devices before their adoption for field use. Several methods of testing the efficiency of an absorbing device are available. When a gas-tight chamber or tank of suitable size is available it is possible to produce known vapor concentrations by introducing a measured quantity of material. An equally satisfactory method is to compare the results obtained with the device in question with those given by a method known to be accurate.

The introduction of a known quantity of material into a train connected to the absorber is satisfactory in some cases, but it is hard to provide an even dispersion of vapor, and if the material is introduced in the form of a solution the presence of the solvent may affect the efficiency of absorptions.

The efficiency of a single absorbing tube may be estimated by measuring the quantity of gas absorbed in a second tube of the same type placed in series. Unfortunately, this method sometimes leads to erroneous results. Thus Paluch[14] found that a second impinger collected only a small part of the SO_2 and H_2S passing through the first impinger. This method also indicated that the impinger was fairly satisfactory for the collection of NO_2, whereas it was less than 30 per cent efficient as shown by other methods,[15] while in their work on lead fume Littlefield, et al. found more in the second impinger than in the first.[2]

Another method is to use two absorbers of the same type in parallel, one running at a much faster rate than the other. This method is useful primarily in ascertaining the maximum rate of flow at which a device can sample effectively.

A very convenient method of testing both indicating and absorption apparatus is one using a gas cylinder filled with a synthetic gas mixture for reference. This obviates the use of gas-tight air chambers.

CLASSIFICATION OF GASES

The following gases and vapors are readily soluble in the absorbing agent commonly employed, and can be absorbed with success in fritted glass bubblers, or the Nichols absorber. It is possible that the impinger may be used for these gases:

Acetic acid, acetone, ammonia, hydrochloric acid, hydrofluoric acid, nitric acid, methanol, amyl acetate, butyl acetate, carbon disulfide, formaldehyde, and hydrogen cyanide.

The following gases are less soluble, and more care must be taken or absorption will not be sufficiently complete. One or more fritted glass bubblers in series are recommended.

Sulfur dioxide, sulfur chloride, hydrogen sulfide, phosgene, phosphine, phosphorous chlorides, carbon dioxide, chlorine, bromine, iodine, ozone, arsine, aniline, phenol, diethyl ether, and acrolein.

The last group of gases requires special methods for sampling:

Benzene, toluene, and xylene—absorb in nitrating acid in fritted glass Petri tube at 0.25 l.p.m., or in glass bead or pearl column at 0.05 l.p.m.

Nitrogen dioxide—use several fritted bubblers in series, condense with liquid nitrogen,[16] or collect in sampling bottles.

Nitric oxide and carbon monoxide—collect in sampling bottles or tubes.

Halogenated hydrocarbons — pass through combustion apparatus and collect acid halides and free halogen in any suitable absorber, or absorb in amyl acetate using fritted bubblers.

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F. H. GOLDMAN, *Chairman*
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APPENDIX

Gases Determined by Various Absorbing Devices

Device	Air Flow	Gas	Absorbing Reagent	Efficiency	Reference
Impinger	1 c.f.m.	Sulfur dioxide	NaOH	80–90% A *	Paluch
		Sulfur dioxide	NaOH	Not checked	Gurney
		Sulfur dioxide	I_2	90% B **	Barnes
		Acetic acid	NaOH	95% A	Paluch
		Ammonia	H_2SO_4	95% A	Elkins
		Ammonia	H_2SO_4	Not checked	Buxell
		Hydrochloric acid	Na_2CO_3	Not checked	Buxell
		Nitric acid	Na_2CO_3	Not checked	Buxell
		Chloronaphthalene	Amyl acetate	About 90% B	Elkins
		Ozone	KI	95% B	Barnes
		Nitrogen dioxide	KI	95% B	Barnes
		Nitrogen dioxide	NaOH	80% B	Elkins
		Nitrogen dioxide	NaOH	About 30% A	Elkins
		Nitrogen dioxide	Na_2CO_3	Not checked	Buxell
		Mercury	I_2	90% B	Barnes
		Hydrogen sulphide	I_2	50% A	Paluch
	½ c.f.m.	Phenol	NaOH	90% A	Barnes
		Formaldehyde	NaOH	90% A	Barnes
	1 c.f.m.	Hydrogen chloride	NaOH	80% A	Fehnel
Two impingers (in series)		Hydrogen chloride	NaOH	ca 90% A	Fehnel
Single fritted bubbler	5 l.p.m.	Sulfur dioxide	NaOH	95% A	Paluch
		Hydrogen sulphide	I_2	95% A	Paluch
	4 l.p.m.	Sulfur chloride	NaOH	95% A	Elkins
	10	Chloronaphthalene	Amyl acetate	90% B	Elkins
	2	Carbon bisulfide	Alcoholic KOH	95% B	Elkins
	1	Carbon dioxide	Dilute $Ba(OH)_2$	60–80% B	Elkins
	1	Hydrochloric acid, chlorine	$NaAsO_2$	95% A	Fredrick
	1	Bromine	KOH	——	Deery
	1	Bromine	KI	95% B	Goldman
	1	Nitrogen dioxide	NaOH, H_2O_2	90% A	Coleman
	1	Nitrogen dioxide	H_2SO_4, H_2O_2	90% A	Coleman
	3-14	Hydrogen chloride	NaOH	ca 95% A	Fehnel
Two fritted bubblers (in series)	1 l.p.m.	Sulfur dioxide	I_2	——	Deery
	5	Hydrochloric acid	NaOH	95% B	Fredrick
	5	Phosgene	NaOH	95% B	Fredrick
	5	Nitrogen dioxide	NaOH	50–70% A	Fredrick
	5	Nitrogen dioxide	H_2SO_4, H_2O_2	50–70% A	Fredrick
	5	Nitrogen dioxide	Na_2O_2	50–70% A	Fredrick
Three fritted bubblers (in series)	0.5 l.p.m.	Phosphine	KBr, Br_2	——	Burke
	0.5	Phosgene	Aniline solution	——	Burke
	0.5	Ether	H_2SO_4, $K_2Cr_2O_7$	——	Burke
Nichols absorber	1 c.f.m.	Sulfur dioxide	I_2	——	Fluck
		Chlorine	KI	95%	Fluck
Semi-fritted Petri tube	0.25 l.p.m.	Benzol	Nitrating acid	95% A	Elkins
Glass bead column	0.05 l.p.m.	Benzol	Nitrating acid	95% A	Elkins
	1 l.p.m.	Hydrochloric acid, chlorine	$NaAsO_2$	——	Gurney
	1 l.p.m.	Hydrogen cyanide	Na_2CO_3	——	Gurney
Multiple absorber	1 l.p.m.	Carbon tetrachloride	Amyl acetate	90% A	Elkins
10 bulb Meyer tube	0.2 l.p.m.	Ozone	KI	95% A	Fredrick
Liquid nitrogen trap	0.2 l.p.m.	Nitrogen dioxide	——	95% A	Fredrick

* "A" indicates determined on known concentration of substance.
** "B" indicates calculated from amount found in second absorber.

III. Report of Sub-Committee on Dust Procedures in Air Analysis

THIS committee makes no report for the current year but refers to its previous annual reports in the *Year Books 1936–1937* and *1937–1938*. Members of the committee are watching developments in regard to the midget impinger.*

* See U. S. Bureau of Mines, Information Circular 7076, June, 1939, by H. H. Schrenk and Florence A. Feicht.

J. J. BLOOMFIELD, *Chairman*
THEODORE HATCH
CHARLES R. WILLIAMS

IV. Report of Sub-Committee on Bacteriological Procedures in Air Analysis State of Suspension*

AMONG the more important objectives of bacteriologic procedures in air analysis is the definition of conditions which introduce bacteria into air, which maintain them in the air, or which remove them from the air. Definition of the nature of the source, the bacterial load, and the efficiency of purification devices is necessary to correct sanitary interpretation. The distinction between microörganisms from body tissues introduced into air by violent respiratory processes such as coughing, sneezing, talking, and singing, and the miscellaneous ubiquitous organisms associated with decomposing organic matter raised as dust is of particular hygienic importance. The former provide a direct means for the spread of infection through aggregations sharing semi-enclosed atmospheres. The latter may or may not have pathogenic significance according to the sources and the conditions under which they originated.

The state of suspension of microorganisms introduced into air by these two procedures differs. Nuclei from droplets small enough to evaporate before falling the height of a man are generally much finer than bacteria-bearing particles raised by processes of attrition. If the very fine dust generated in industry may be disregarded as bearers of bacteria, the generalization that the nuclei are relatively small compared with contaminated dust particles may be of sanitary significance.

The distinction between the size of particles becomes of considerable importance in characterizing the behavior of these particles in air, and the processes of removal from the air. The change in the ratio of weight to surface resistance as the particles decrease in size dominates the behavior of aerial suspensions. Coarse particles settle rapidly, travel shorter distances, and remain aloft for shorter times in the relatively quiet air

* The name of Dr. Elizabeth Chant Robertson, Hospital for Sick Children, Toronto, was added to the committee during the summer of 1939.

of rooms. They bring about accumulations within the room which may, however, be returned to the air at intervals of renewed activity. The fineness of droplet nuclei causes them to remain suspended much longer times in ventilating currents and pass with these currents from the space with less degree of sedimentation. From a hygienic viewpoint, therefore, not only the infectivity of the particle but also the opportunity of the particle to be breathed by occupants of the space may differ.

In harmony with these differing characteristics, the efficiency of purification processes depending upon the state of suspension will vary. Larger particles are more readily precipitated and filtered and washed from the air, but are less subject to bactericidal irradiation than the organisms contained in the smaller droplet nuclei. Droplet nuclei, for the same reason, pass more readily than coarser particles through the nasal passage and penetrate deeper into the lung.

The physical properties of particles suspended in air on which depend these important engineering and hygienic characteristics arise from the well recognized fact that as particles become smaller in size the mass of a particle decreases more rapidly than the surface area. The former varies with the cube and the latter with the square of the diameter. The gravitational pull which causes the particle to fall decreases faster than the resistance to passage through the air which depends upon the surface area. Stokes' law thus provides the means of differentiating states of suspended particles in air. It applies to particles which are so small that the surface resistance to movement through the air is relatively large as compared with the gravitational pull defined by Newton's laws. These are the basic conditions for aerial suspensions of particles, and thus the falling velocity becomes the key to the analysis of the state of suspension. For our purposes Stokes' law may be expressed by the following equation:

$$V = 2/9\ r^2 \frac{(s-l)g}{u}$$

where V = velocity of settling,
r = radius of particle,
s = density of particle,
l = density of fluid,
g = acceleration of gravity,
u = viscosity of suspending fluid.

Any consistent system of units may be used. Knowing the physical constants of air, the equivalent diameter can be computed from the settling velocity.

The number of uniform particles, uniformly distributed, which settle on unit area in unit time will be equal to the product of the number per unit volume multiplied by falling velocity. The ratio of the number of particles settling on unit area divided by the number of particles per unit volume therefore measures the settling velocity. The average velocity of particles falling at different rates multiplied by the average concentration of particles per unit volume likewise gives the number falling on unit area in unit time. It does not follow from Stokes' law, however, that the average diameter is the diameter of the average particle, but for convenience we may substitute the average falling velocity in Stokes' formula and derive the diameter of a hypothetical particle satisfying these conditions and call its diameter the equivalent diameter.

Recognizing the supreme importance of state of suspension in sanitary air analysis, this sub-committee in its first report described a practical index of coarseness determined by ratio of volume counts to area counts.

The count on a Petri dish, exposed for 15 minutes, compared to the cylinder count indicates the equivalent size of particles sampled. The area of a Petri dish being 1/15 sq. ft., the number of bacteria settling in 15 minutes approximates the number settling per sq. ft. per minute. If all particles settle at the same rate, the height of fall of the last particle

TABLE 1

Comparative Coarseness of Bacteria-Bearing Dusts

Source	*Class*	*Ratio of Volume Count (10 c. ft. Centrifuge Sample) to Area Count (15 Min. Exposure of Petri Dish)*	*Mean Settling Velocity (ft. per Min.)*	*Equivalent Diameter of Particle in Microns*
Cotton mills	Dusty (carding, etc.)	4.4	2.27	19.6
	Settled (spinning, etc.)	12.3	0.81	11.7
	Humidified (weaving, etc.)	24.5	0.41	8.3
Woolen mills	Dusty	2.95	3.39	24
	Settled	9.13	1.1	13.6
	Humidified	23.8	0.42	8.4
Rayon mills	Weave rooms	10.8	0.925	12.5
Outside air	Factory	0.4	25	65
	Laboratory	6.0	1.67	16.8
Droplet nuclei		250	0.04	2.6

reaching the plate would indicate the depth of air over 1 sq. ft. which contained the bacteria falling in a minute. Conversely, the number which settle on a sq. ft. per minute divided by the number per cu. ft. determined by the centrifuge gives the average falling velocity per minute. Since the falling velocity of particles of similar densities is proportional to their surface areas, this quotient may be used as an index of equivalent particle size.

The usefulness of this index of coarseness of suspended matter has been tested under practical conditions with the results shown in Table 1.

Similar sequences obtained by the ratio of filter to plate counts indicate the same great diversity in the states of suspension of bacteria-bearing particles. The distribution of colonies in the centrifuge tube also provides a clue to the relative coarseness of particles.

Heavier particles tend to settle in greater numbers near the base of the cylinder, while the bacteria in "nuclei" from evaporating droplets will tend toward more equal distribution throughout the length of the tube. Since the distribution indicates the coarseness of the material deposited, the tube should be divided along its length into 4 equal sections and the count in each section recorded. Since some of the fine particles theoretically must escape with the air flow, the distribution can also be used to indicate the magnitude of this error.

Such empirical indices of coarseness of suspended particles have proved useful in sanitary interpretation and in engineering design.

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W. F. WELLS, *Chairman*
EARLE B. PHELPS
ELIZABETH CHANT ROBERTSON
C.-E. A. WINSLOW

ADDENDA

Relation of State of Suspension of Bacteria in Air to Their Quantitative Enumeration by Various Technics

AMONG the various technics that have been employed in the examination of air for bacterial and other microbic life, filtration, impingement, sedimentation, centrifugal treatment, etc., the value of the resulting sample as a quantitative measure of the numbers actually present, depends largely upon what may be termed the state of suspension of the organism.

This expression implies that organisms floating in the air are seldom free-floating, single cells, but are usually attached to other particulate matter, such as dust particles or the nuclei resulting from the evaporation of droplets of saliva. The size of the unit of matter upon which the bacteria are carried, and its specific gravity, determine its settling velocity in air, as Mr. Wells has shown. Stokes' law is equally applicable to the forces operating in the air centrifuge, where the separation of particles is brought about by "settling" under an augmented force.

In a critical study of the quantitative performance of the air centrifuge, it has been found that when bacteria are suspended in the air by spraying a broth culture into an experimental chamber, the resultant state of suspension is such that the centrifuge recovers only about one-third the number of organisms that are recovered by quiescent settling upon prepared plates during the ensuing 7.5 hours.

A study has therefore been made of the mechanics of settling in the air centrifuge and in the air of a quiescent chamber. The full details of this study are being prepared for publication. Briefly summarized, the following type of information has been derived and subjected to experimental verification.

Recovery by settling upon prepared plates of nutrient media simulates the well known logarithmic death rate curve: that is, the rate of recovery appears to be proportional to a certain hypothetical initial concentration.

Recovery by the Wells centrifuge, at successive intervals during the same period, likewise indicates a logarithmic decrease in surviving numbers. The numbers recovered at any time bear a certain numerical relation to the total numbers settling subsequently, roughly, one-third to one-half the subsequent settling in 7.5 hours.

The total numbers recovered, either by settling or by the centrifuge, appear to be but a small proportion of the numbers initially introduced (estimated from amount and content of broth culture sprayed). Similar results have been obtained by substituting a solution of Uranine for the bacterial culture in order to obviate the uncertainty involved in the death of bacteria during the experiment.

EARLE B. PHELPS

DISCUSSION

Droplet Nuclei

WE eagerly await the publication of Professor Phelps's researches on droplet nuclei suspensions. The theory of air-borne infection and sanitary air control needs the keen analytical methods by which he threw so much light on the problems of water, sewage, and milk sanitation.

Before the brief review of his studies during the past two years leads us to the conclusion that we have much underestimated the numbers of droplet nuclei present in normal atmospheres when computed from the recovery shown in air centrifuge samples, it is necessary to examine into the state of suspension of the nuclei studied in his experiments. From figures on settling rate given in an unpublished manuscript which he courteously permitted me to read, it is clear that they are exceedingly fine. The settling velocity, 16 in. per hr., is less than the smallest value given in the table in the subcommittee report. From an elaborate mathematical examination of the air centrifuge he further concluded that the critical falling velocity of particles, all of which would be taken out in the centrifuge, is about 36 in. per hour, and correspondingly smaller percentages would be collected in the centrifuge tube as particles decrease in diameter from this critical size. The value of 33–50 per cent removal of particles falling at a velocity of 16 in. an hr. corresponds with the figures obtained from mathematical analysis.

The size of droplet nuclei depends first upon the diameter of droplets from which they are derived. Droplet diameters can be experimentally determined by progressively increasing the bacterial concentration of the atomized fluid until the number of colonies obtained in the centrifuge becomes constant. Until the number of organisms approaches the number of droplets there will be a proportional increase in the number of colonies. When the number of organisms exceeds the number of droplets the chance that each droplet will contain more than one organism is increased, but only one colony is produced from this droplet. The relationship between the number of organisms and the number of colonies will follow Poisson's exponential law. It is therefore possible from such a curve to compute the number of droplets produced from a given quantity of culture, and experiments conducted by E. C. Riley on nuclei produced by boiling air through a dilute culture fluid and also by a Park spray humidifier have shown that approximately 10 million droplets are produced per cc. of fluid.

The mass of nucleus can be estimated from a knowledge of the size of the droplet from which it evaporated and the solids contained in the culture liquid. In most of our experimental work we dilute a culture broth about 10 times. The culture broth itself contains 2 per cent solids. Then the mass of the resulting nucleus would be in the order of 2×10^{-10} grams, which would be approximately 5μ in diameter. It would seem that such particles would be fairly well represented in centrifuge samples according to Professor Phelps's analysis. It would also seem that suspensions on which he experimented must be considerably finer and that nuclei produced by coughing, sneezing, and talking might be somewhat larger. Apparently we are concerned with nuclei within reasonable range of the air centrifuge, but we should not overlook the possibility of the existence of nuclei of

hygienic importance in natural atmospheres which are being poorly represented in our centrifuge samples.

Routine comparisons of the number of organisms in an infecting fluid atomized into an air stream in studies of experimental air-borne disease with the number recovered from the air give somewhat similar results to those reported by Professor Phelps. From 25 to 50 per cent of the organisms in broth suspensions atomized into the air stream were actually recovered in the centrifuge, though distilled water suspensions gave smaller percentages. Whether this is due primarily to the fineness of the resulting nucleus or the fact that more of the organisms were destroyed in the process of atomization or that more than one organism per droplet produced a colony has not yet been determined.

Professor Phelps's studies will undoubtedly throw much light on this important problem. Until the theory of suspended particles has been more fully developed, it will be necessary to progress in the art of air sanitation with the empirical methods outlined in the report.

W. F. WELLS

Analyzing Frozen Desserts and Ingredients*

Laboratory Section

AT a Joint Session of the Laboratory and Food and Nutrition Sections, held at the 65th Annual Meeting in New Orleans, La., in 1936, William B. Palmer, Chairman of the Committee on Milk and Dairy Products of the Food and Nutrition Section made a recommendation [5] in the report of that committee that a joint committee be appointed of representatives of the Food and Nutrition and Laboratory Sections to establish standard methods for analyzing ingredients, other than milk and cream, used in ice cream and frozen desserts, this committee to be made responsible to the Coördinating Committee on Standard Methods. After the Sections had taken enabling action, the committee was organized during the following year and has made four progress reports [1, 3, 4, 6] (two to the Laboratory Section and two to the Food and Nutrition Section). Establishment of refereeships and associate refereeships to cover the various phases of the work have been discussed in the reports of the committee. At this time it is with a great deal of satisfaction that your committee is in a position to report that at the close of this Annual Meeting several manuscripts containing detailed methods and procedures for the examination of frozen desserts and certain ingredients thereof will be ready for distribution in mimeographed form to persons within and outside of the Association who may be in a position to give these proposed methods laboratory trial or to furnish comments or criticisms of them to the committee.

During 1938–1939 the refereeships in the committee have remained unchanged, although some changes in associate refereeships have taken place and some new associate referees have been appointed. A list of the full personnel of the committee is published elsewhere in this *Year Book*.

It is urged again in this report that the members of this Section hear and study the report that the representatives on the committee from the Food and Nutrition Section will make to that Section at this Annual Meeting because that report may cover in greater detail than does this necessarily brief summary certain of the activities of the committee, as have similar reports [1, 6] that have been presented before meetings of that Section.

During the year just closing no full meeting of the joint committee was held as the members of the committee decided that progress would not thereby be materially hastened and felt that the allotted funds might be saved for other purposes. However, in order to clarify and make more uniform the work of the bacteriological referees on this committee with that of the Standard Methods Committee for the Examination of Dairy and Food Products, a meeting of those

* Report of the Joint Standard Methods Committee on Analyzing Frozen Desserts of the Laboratory and Food and Nutrition Sections (presented to the Laboratory Section).

referees with Dr. Breed, chairman of that committee, was held during the year.

Dr. F. W. Fabian, Referee for the Microbiological Examination of Ingredients, has edited reports of associate referees working under his supervision, with the result that the following manuscripts of proposed methods can be made available to interested persons following the Annual Meeting:

The Microbiological Examination of Sweetening Agents (Sucrose (beet and cane), Lactose, Cerelose, Invert Syrup, Liquid Sugar and Honey), by Associate Referee Harlow H. Hall

Determination of the Number of Microorganisms in Powdered Milk, by Associate Referee Paul S. Prickett

Suggested Standard Methods for Bacterial Analysis of Evaporated and Condensed Milk, by Associate Referee P. A. Downs

The Microbiological Analysis of Coloring Solutions, Flavoring Extracts, Fruits and Nuts, by Associate Referee M. J. Prucha

James Gibbard, Referee for Methods for the Examination of Gelatins and Stabilizers, in collaboration with his subcommittee of associate referees has submitted proposed methods for the examination of gelatin, the stabilizer most commonly used in frozen desserts. In the present state of world affairs Mr. Gibbard sees at the moment no opportunity of giving the work on gelatin standards any further serious consideration in his laboratory at Ottawa, but at considerable inconvenience to himself he has brought this project to a point where the method approved by his committee can be given a trial by all interested persons, whose comments will be welcomed.

Milton E. Parker, Referee on Sediment Testing of Frozen Desserts and Ingredients, in collaboration with Associate Referees Bernard E. Proctor and E. C. Thompson, has ready for mimeographed distribution a manuscript entitled "Sediment Testing of Frozen Desserts and Ingredients." This report presents methods for sediment testing of frozen desserts and ingredients including milk products, stabilizers, fruits, nuts, syrups, and flavoring materials. Your attention is especially directed to the definition of sediment in frozen desserts which Mr. Parker has submitted in this report.

Dr. A. H. Robertson, Referee on Microbiological Examination of Frozen Desserts, has revised the manuscript on the Microbiological Examination of Frozen Desserts which he presented last year to have it more closely conform with the new Seventh Edition, 1939, of *Standard Methods for the Examination of Dairy Products*, in a future printing of which it is hoped this manuscript may be inserted. This proposed bacteriological method which has already been reviewed by the committee more thoroughly than have the reports of associate referees, can at once be mimeographed and placed in the hands of interested persons.

Dr. J. H. Shrader, as Referee for the Chemical Methods of Frozen Desserts, has the task of coördinating the chemical aspects of the activities of this committee with similar activities in other associations. As liaison agent of the committee he has been in active contact with the persons officially responsible for similar activities in the Association of Official Agricultural Chemists, the Dairy Science Association, the International Association of Milk Sanitarians, and other organizations. Dr. Shrader reports that Associate Referee W. H. Martin (also a referee for the Association of Official Agricultural Chemists) has prepared a manuscript on Rapid Methods for the Determination of Butter Fat in Frozen Desserts, in which a method for use with vanilla ice cream and another for chocolate ice cream will be recommended. In similar form is a proposed method for Detection of Stabilizers in Ice Cream, prepared by Associate Referee F. Leslie Hart, who is also

Referee on Gums in Food, of the Association of Official Agricultural Chemists. Associate Referee George Jaggard has been conducting studies on the phosphatase test as the four proposed methods apply to frozen desserts, but this study is not as yet ready for publication. Dr. Shrader has reported that Associate Referee T. H. Tracy is putting into manuscript form technic for preparing frozen dessert samples for analysis.

Last year your chairman reported that the committee was slowly emerging from the state of closeted study into a phase of activity that might be participated in by any member of the two parent sections or by interested persons. It will have been evident from this report that much intra-committee activity has taken place during the year. For a number of reasons it has seemed well to make progress slowly, and manuscripts have been given careful study by a small group of persons preparatory to having them in shape at this time to be submitted for general criticism and comments. It is hoped that during the coming year many suggestions can be submitted to the referees or to the chairman of the committee. It is proposed that the Association, through the Coördinating Committee on Standard Methods, consider ways and means of setting up an editorial committee in order that proposed methods from this committee may be carefully edited and coördinated with procedures either already in print or in preparation in this and in other associations. The suggestion is made that on an editorial committee there should be representation of the Association of Official Agricultural Chemists, the Dairy Science Association, and the International Association of Milk Sanitarians, in addition to representatives from the Food and Nutrition Section and the Laboratory Section of this Association.

It is requested that the committee be continued, if such be the pleasure of the Section, in the hope that the next edition or reprinting of the *Standard Methods for the Examination of Dairy Products* may be augmented by methods, at least tentative in character, for the examination of frozen desserts and their ingredients which will tend to make that volume of methods cover the field of dairy products.

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FRIEND LEE MICKLE, *Chairman*, Joint Committee

Representatives from the Laboratory Section

FRIEND LEE MICKLE, *Chairman*
JAMES A. GIBBARD
A. H. ROBERTSON

Representatives from the Food and Nutrition Section

F. W. FABIAN, *Chairman*
M. E. PARKER
J. H. SHRADER

Standard Methods for the Examination of Dairy Products

Laboratory Section

FOLLOWING the approval by the Laboratory Section of the Bacteriological Methods prepared for the volume *Standard Methods for the Examination of Dairy Products*, this report was presented to the Committee on Research and Standards of the Association, and eventually to the Governing Council and Executive Board. Approval for publication as a part of this Standard Methods Report was secured in January, 1939.

The report on Methods of Bioassay for Foods prepared by the Food and Nutrition Section was presented to the same bodies and, likewise, received approval for publication.

The manuscript covering the Chemical Methods for the Examination of Dairy Products prepared by the Association of Official Agricultural Chemists was combined with these two manuscripts and sent to the printer last March. The printed report was placed on sale in June, 1939.

Because of a general feeling that the new methods for detecting the activity of phosphatase in milk which have been found generally useful as a means of detecting underpasteurized milk should be given in this report, Dr. J. H. Shrader, Referee for Chemical Methods, was asked to prepare a general report on these methods. This has been included as an Appendix to the main report. Four different procedures proposed for making phosphatase tests have been given in the Appendix under a heading which states that these procedures have not yet been studied comparatively nor approved as Standard Methods by the American Public Health Association.

In a report of this character where the manuscript was prepared by several different groups, it is not surprising that some oversights occurred. To provide prompt correction of errors an errata slip has been printed and distributed to purchasers of the new report.

Some have found difficulty in securing sodium hexametaphosphate as used in the new Kay-Neave phosphatase test published for the first time in this Standard Methods report. This may be obtained from the Hall Laboratories, Inc., 300 Ross Street, Pittsburgh, Pa.

Three thousand copies of the Seventh Edition of *Standard Methods for the Examination of Dairy Products* were printed. The New York office reports that over 1,000 copies were sold before September 1, 1939. The Dairy Products report has been the best seller of the month for the Book Service ever since it first appeared.

The title of this report is broader in its meaning than the one that has previously been used by Standard Methods of Milk Analysis because procedures are also given for the examination of Plain Ice Cream and Butter. Methods for the Examination of Frozen Desserts are also being prepared for this report by a joint committee of the Laboratory and the Food and Nutrition Sections.

C. A. Abele, Referee, completed his studies carried out for the committee on the effect of using the new standard tryptone, glucose, beef extract, milk agar, and this was published in the August number of the *American Journal of Public Health*. He has also been able to carry out a study of counts obtained with the new agar from 1,000 samples of raw milk in the Montgomery Laboratory of the Alabama State Department of Health. Immediate publication of this report was secured through the coöperation of the *Journal of Milk Technology* and this report is available in the September number of that *Journal*. Separates giving the results of both of these studies have been widely distributed by the Dairy Products Committee to laboratories doing official milk control work. If any interested persons have been overlooked, copies of both separates may be obtained on application to the New York City office of the American Public Health Association.

Mr. Abele found that, even though counts were increased by the use of the new agar, there is no real reason for feeling that the bacterial count standards fixed in various ordinances and regulations need to be changed. The new agar reduces the possibilities that the occasional actual presence of numbers of bacteria in excess of the limit fixed by standard regulations will escape notice, and a proper follow-up at the source of production—as has ever been the case—should result in the reduction of such excessive counts. Administrative officials generally report that their experience with the new agar thus far justifies the conclusions reached by our Referee.

Some difficulty has been experienced because milk precipitates readily in the agar unless proper precautions given in the report are observed. Good quality skim milk only should be used. It should not be added until just before the final sterilization, and the melted agar should not be subjected to prolonged heating. In case precipitates form even when these precautions are observed, sterilize the milk separately from the agar and add the sterile milk to the agar just before the plates are poured. It has been determined that the precipitates are calcium phosphate and calcium caseinate that ought not to be removed from the agar until it is proved that this removal will not injure the nutritive properties of the agar. A study of recently developed incubators is to be presented at this meeting by Prof. C. S. Pederson. Some of these are cooled and are capable of operation at 32° C., even where kept in laboratories where the room temperature is warmer than 32° C.

Dr. E. H. Parfitt, Associate Referee for Methods for the Examination of Butter, recommends that these methods be studied actively in coöperation with the Association of Official Agricultural Chemists and with the expectation that Section K will eventually be developed further than it is in the present report.

R. S. BREED, *Chairman*
A. H. ROBERTSON
MAC H. MCCRADY
F. C. BLANCK
R. V. STONE
A. J. SLACK
C. A. ABELE

Standard Methods for the Examination of Water and Sewage

Laboratory Section

THE eighth edition of *Standard Methods for the Examination of Water and Sewage* was published in June, 1936. The first printing of 3,000 copies was exhausted in 9 months. The second printing, also of 3,000 copies, appeared in March, 1937, and a third printing of 2,000 copies was issued in September, 1938. This total of 8,000 copies is practically exhausted and a fourth printing must be made before the end of the year. This brings the total sales of the last three editions to 26,000 copies.

It seems impossible to publish a book of this kind free from typographical errors. An attempt has been made in each new printing to correct these errors. We are indebted to users of the book for calling attention to them and hope that such coöperation will continue. A complete list of corrections made in each printing will be published shortly in both the *American Journal of Public Health* * and the *Journal of the American Water Works Association.* This will enable those who have purchased the earlier printings to make the necessary changes without buying the latest printing. It is possible that there are still errors which have not come to our attention. We would be glad to know of them.

For the past 3 years the activity of your committee has been confined to work with the coliform group of bacteria. Under the direction of M. H. McCrady, three coöperative studies have been made. Two of these have been reported and have dealt with the various media recommended for confirmation of the coliform group. Incidentally the judgment of the committees in insisting on the use of a non-inhibitive broth for the initial incubation period has been justified. McCrady's reports will serve as a basis for the next revision of these methods.

The third study has just been completed and a manuscript submitted for publication. This deals with the use of MacConkey broth as a primary medium for detection of coliform organisms. Bile salts have been used for many years in the British Empire as essential ingredients for this medium and the inclusion of sodium taurocholate in the formula is recommended in the latest report from the Ministry of Health. It seemed desirable to make an attempt to reconcile English and American practice. McCrady's conclusions are as follows:

A limited study of the relative utility of MacConkey broth and lactose broth as primary media and of brilliant green bile as a confirmatory medium was undertaken by 4 different laboratories. The results of this study may be summarized as follows:

1. The MacConkey presumptive (presence of gas within 48 hrs.) did not prove to be, in general, a satisfactory indication of the presence of coliform organisms. False presumptives (or at least presumptives from which such organisms were not isolated by means of the usual complete confirmation

* See *A.J.P.H.*, Jan., 1940, p. 104.

procedure) constituted 2, 20, 39, and 40 per cent of all MacConkey presumptives encountered by the Maryland, Quebec, Toronto, and New York laboratories, respectively.

2. Complete confirmation of MacConkey presumptives yielded about as many coliform isolations as did like confirmation of the larger number of lactose broth presumptives, or of brilliant green bile confirmatory gas positives. The economy in number of presumptives to be confirmed obtained through the use of MacConkey broth, however, did not appear to surpass that which was secured, in a previous study, through the use of fuchsin broth. The effect of the inhibiting agents employed in these two media upon coliform organisms that may be contained in finished waters has yet to be determined.

3. On the whole, the procedure employing lactose broth and confirmation (gas only) in secondary brilliant green bile appeared to yield more satisfactory results than the other procedures. In the Toronto laboratory, a number of false positives were encountered in brilliant green bile as well as in MacConkey broth; but there also, the procedure employing brilliant green bile, whether or not followed by complete confirmation, proved to be as satisfactory or more satisfactory than that in which MacConkey broth was used.

A year ago your committee conducted a symposium on so-called " slow lactose fermenters " encountered in water examination. Some of the papers presented at that time have been published. This group of organisms constitutes the most difficult problem of the water analyst today in regard to both laboratory procedure and interpretation. A satisfactory solution is not in sight.

Attention is called to the review of the present status of the group of coliform bacteria which appeared in the June number of *Bacteriological Review*. While this was not a committee activity, the author, Dr. Parr, is a member of the committee and is at work on coliform group variants.

We have had various inquiries concerning the date of appearance of the next—the ninth—edition of *Standard Methods for the Examination of Water and Sewage*. No definite plans have been made. It will be impossible to publish a new edition before 1942 at the earliest. We are not certain that significant numbers of important changes warrant any hurry on the part of the committee in the preparation of a new edition. However, this is a matter for the Section, through its Coördinating Committee, to decide.

JOHN F. NORTON, *Chairman*

Organization, Content, and Conduct of an Institute on Public Health Education*

Public Health Education Section

SHORTLY after the 1938 Annual Meeting of the American Public Health Association, the chairman of the Public Health Education Section appointed the following committee to develop plans for a Public Health Education Institute to be conducted in connection with the 1939 Annual Meeting of the Association:

Mary P. Connolly, Detroit Department of Health
Evelyn K. Davis, National Organization for Public Health Nursing
H. E. Kleinschmidt, National Tuberculosis Association
W. F. Walker, The Commonwealth Fund
C. E. Turner, (*ex officio*)
Ira V. Hiscock, Sc.D., Yale University, *Chairman*

Preliminary plans for the Institute were formulated through correspondence. This procedure was practical because of the previous experience of all members of the committee in developing and in conducting previous Institutes of the Association.

After the selection of topics and pooling of ideas as to speakers and leaders and organization of the Institute, invitations were sent to the proposed leaders and speakers, and the following program was arranged:

PUBLIC HEALTH EDUCATION INSTITUTE

Theme: Health Education for Three-Thirds of a Nation

General Plan: Formal addresses limited
Group discussions featured

Sunday, October 15, 10 A.M.

General Session

1. Outline of Institute Program	Ira V. Hiscock, Sc.D. (Chairman) Yale University
2. Aims of Health Education for the Public and for Schools	Benjamin Gruenberg, Ph.D. Special Consultant U. S. Public Health Service
3. The Tools of Health Education	H. E. Kleinschmidt, M.D. National Tuberculosis Association

* Report of the Chairman of the Committee on the Health Education Institute.

11:15 A.M.–12:30 P.M. Group Discussions, with Leaders

1. The Spoken Word	Iago Galdston, M.D. New York Academy of Medicine
2. The Radio	K. W. Grimley Alabama Tuberculosis Association
3. The Newspaper	Byron McCandless Tuberculosis League of Pittsburgh
4. Printed Matter	Raymond S. Patterson, Ph.D. John Hancock Mutual Life Insurance Co
5. Exhibits	Bruno Gebhard, M.D. Technical Consultant The American Museum of Health
6. Motion Pictures	H. E. Kleinschmidt, M.D. National Tuberculosis Association

Sunday, October 15, 2 P.M.

General Session

Channels for Reaching the People

Professional Groups	W. W. Bauer, M.D. American Medical Association
Lay Groups	Mary P. Connolly Detroit Department of Health
Student Groups	Paul B. Cornely, M.D., Dr.P.H. Howard University

3:15 P.M.–4:45 P.M. Group Discussions, with Leaders

Experience in Counties	Henry J. Otto, Ph.D. The W. K. Kellogg Foundation
Experience in Cities	Kenneth Widdemer New York Committee on Neighborhood Health Development
Experience in National Agencies	David Resnick National Society for Prevention of Blindness
Experience in Schools	Fannie Shaw State Department of Health Atlanta, Ga.
Preparation of Personnel	Leona Baumgartner, M.D., Ph.D. New York City Department of Health

Monday, October 16, 9:30 A.M.

General Session

How to Appraise Health Education Content and Materials

1. W. P. Shepard, M.D., Metropolitan Life Insurance Company
2. Mayhew Derryberry, Ph.D., U. S. Public Health Service
3. Ruth Grout, Ph.D., Tennessee Valley Authority

10:30 A.M. Group Discussions of Evaluation, with Leaders

1. Personal Contacts and Visual Methods	Mayhew Derryberry, Ph.D. U. S. Public Health Service
2. Program Planning	Philip Broughton New York City Department of Health
3. School Health Education	Louise Strachan National Tuberculosis Association

12:30 P.M. Joint Luncheon Session Health Education Institute and International Society of Medical Health Officers

Presiding: Dr. E. L. Bishop
President, International Society of Medical Health Officers

Practical Use of Visual Methods	W. L. Halverson, M.D., Dr.P.H. Health Officer, Pasadena, Calif.

2:00 P.M. General Session

Organization of a Coördinated Health Education Program

1. The Health Education Coördinator Plan	H. H. Walker, Ph.D. University of Tennessee, Knoxville
2. A State Plan	Reba Harris Kentucky State Department of Health
3. A Hospital Plan	A. W. Dent Supt., Flint-Goodrich Hospital Dillard University, New Orleans

3:15–4:45 P.M. Group Discussions, with Leaders

1. Rural-County Experience	H. H. Walker, Ph.D. University of Tennessee, Knoxville
2. City Experience	Lucy Morgan, Ph.D. Hartford Tuberculosis and Public Health Society
3. Health Education Councils or Committees	Bleecker Marquette Cincinnati Health Federation

Tuesday, October 17, 9:30 A.M.

High Points of the Institute

Tools for Health Education	Mary P. Connolly Detroit Department of Health
Channels for Health Education	Evelyn K. Davis National Organization for Public Health Nursing
School Health Education	C. E. Turner, Dr.P.H. Massachusetts Institute of Technology
Objectives and Organization of the Program	H. R. Leavell, M.D. Commissioner of Health and Hospitals Louisville, Ky.
Evaluation and Future Planning	Ira V. Hiscock, Sc.D. Yale University

An announcement of the Sixth Institute on Public Health Education containing the complete program was printed and mailed to the membership of the Public Health Education Section, state health officers, selected city health officers, and selected superintendents of schools. As applications for enrollment were received, the following check-list was sent each registrant in order to determine the size and composition of each group discussion. This information was needed to assist the leaders in planning their discussion programs and to assist the management in the allocation of rooms. Subsequently, the names of registrants were given to most of the leaders. Each registrant received a certificate attesting to his registration which he was required to show at the door.

FOLLOWING ARE THE SUBJECTS AND THE DISCUSSION LEADERS OF THE ROUND TABLES WHICH WILL FOLLOW EACH GENERAL SESSION. PLEASE CHECK *One* SUBJECT ON EACH HALF DAY.

Sunday Morning, October 15

Subject (check one only)	*Leaders*
1. The Spoken Word	Iago Galdston, M.D.
2. The Radio	K. W. Grimley
3. The Newspaper	Byron McCandless
4. Printed Matter	Raymond S. Patterson, Ph.D.
5. Exhibits	Bruno Gebhard, M.D.
6. Motion Pictures	H. E. Kleinschmidt, M.D.

Sunday Afternoon, October 15

Channels for Reaching the People

Subject (check one only)	*Leaders*
1. Experience in Counties	Henry J. Otto, Ph.D.
2. Experience in Cities	Kenneth Widdemer
3. Experience in National Agencies	David Resnick
4. Experience in Schools	Fannie B. Shaw
5. Preparation of Personnel	Leona Baumgartner, M.D., Ph.D.

Monday Morning, October 16

How to Appraise Health Education Content and Materials

Subject (check one only)	*Leaders*
1. Personal Contacts and Visual Methods	Mayhew Derryberry, Ph.D.
2. Program Planning	Philip S. Broughton
3. School Health Education	M. Louise Strachan

Monday Afternoon, October 16

Organization of a Coördinated Health Education Program

Subject (check one only)	*Leaders*
1. Rural-County Experience	H. H. Walker, Ph.D.
2. City Experience	Lucy Morgan, Ph.D.
3. Health Education Councils or Committees	Bleecker Marquette

In order to correlate the material to be presented in both the general and group meetings and to assist the speakers who were selected to summarize the high points of discussion in the Tuesday morning session, leaders and speakers were requested to submit to the chairman a digest of the material together with bibliography and outlines for discussion. These digests, with the supplementary notes from the meetings, were mimeographed for distribution to each registrant after the Annual Meeting.

From the list of registrants in each group discussion section, a rapporteur was selected for each meeting. Copies of suggestions were given before the Annual Meeting to each leader and to each rapporteur (copies also to the leader concerned) as follows:

SUGGESTIONS FOR LEADERS OF GROUP DISCUSSIONS

1. Open session as promptly as possible after general session.

2. Give at the outset of the session a brief, challenging statement (10–15 minutes) of objectives, principles, or experiences related to the major topic of the session, as a background for the discussion and questions from your group. If possible, make this presentation from outline notes—please do not read a manuscript. Even if one or two major points be omitted at the outset, they can be included in general discussion or in the mimeographed set of material to be presented later to registrants.

3. Distribute a one-page (or less) outline of suggested topics to focus discussion. *Please send* such list as soon as possible to chairman to be mimeographed.

4. The rapporteur assigned to your session will take notes on major topics and conclusions. At the end of the session, please review these points so that they may be given to the chairman for: (a) use by the summary speaker on Tuesday and (b) for the final digest of *Institute Proceedings* to be prepared for registrants, and for such ultimate publication as may be decided upon.

5. Keep discussion focused on the main theme, restricting individual discussion as necessary to permit of as wide participation as possible.

6. Refer to source material and suggest new material and sources whenever possible.

7. Please give the chairman suggestions as to details in organization or conduct of the Institute program for another year, particularly to avoid errors or problems you have observed in this Institute.

SUGGESTIONS FOR RAPPORTEURS

1. Please make yourself known to the leader of your session before the opening of the session, and sit at the table in the front of the room.

2. Note the major topics discussed, objectives and principles emphasized, and conclusions reached. (Include issues of disagreement, if any.)

3. Review your notes at the conclusion of the session in conference with the leader of the discussion.

4. Give these notes as soon as possible after the session to the chairman of the Institute so that they may assist the speaker who is to summarize the topic on Tuesday and be used in preparing digest for distribution.

5. It would be of much aid to the Tuesday speaker on your subject to have a brief conference with you on these notes if you can conveniently arrange to do so.

6. What suggestions have you as to details in the organization or conduct of an Institute program for another year, particularly to avoid errors or problems you have observed in this Institute?

The central office of the Association, the National Health Library, the National Education Association, the National Tuberculosis Association, and the National Social Work Publicity Council coöperated in arranging tables for display of books and periodicals listed in the bibliographies of speakers and leaders and of source material and illustrations of the Social Work Publicity Council.

A group conference was held of the participants in the New York area 2 weeks before the Institute to discuss details of preliminary plans. A final meeting of the committee, leaders and speakers, to discuss the results, errors, and future plans, was held at luncheon immediately following the last session.

The total paid registration was 197.

SUGGESTIONS

A. *For the Section Council:*

1. That consideration be given by the Section Council to the relative values of: (a) continuing the Institute plan as an activity conducted along present lines preceding the Annual Meeting, or (b) of utilizing such technics as have been developed in the Institute in the preparation of Section meetings some of which might take the form of a symposium. The symposium plan arranged by the Western Branch of the A.P.H.A. in 1939 is worthy of study for Section meetings.

If it is decided to continue the Institute plan:

2. That the objectives and methods of the Institute be reviewed annually.

3. That a request be made for the allocation of any unexpended balance of funds derived from this Institute in 1939 for use in the organization and promotion of future Institutes and for such other expenses as may be related to the development of the Health Education Institute or Symposium Plan.

B. *For the Institute Committee:*

4. That consideration be given to the inclusion of adequate space on the program for discussion of the philosophy and of the content of health education.

5. That the group discussions be arranged in a manner to feature *technics* and *organization,* and (for experienced

health educators) research in evaluation.

6. That two-thirds to three-quarters of the time of the Institute be devoted to group discussions, the remainder being given to general sessions.

7. That in the general session meeting it may be preferable to have only one keynote speaker.

8. That efforts be made to arrange for a period of relaxation in a "get-together" or social hour for Institute members following the first afternoon session.

9. That the objectives of the Institute be explained in advance to all leaders and speakers.

10. That at least a half day preceding the Institute be devoted to a discussion of technics for promoting group discussion by Institute leaders under the guidance of an expert in this field.

11. That leaders of group discussions, at least 2 weeks before the Institute opens, be given lists of registrants (with titles of positions) who have signified their intention to attend their respective sessions.

12. That registrants (on their applications) be given an opportunity: (a) to signify which group discussions they wish to attend, and (b) to submit one or more problems or topics of major interest which they wish to have discussed if possible, such lists to be given the leaders before the Institute opens.

13. That if any of the discussion session meetings are to be small, it would be desirable to have the members of the group sit around a table.

14. That outlines of the major topics to be considered in group discussion be sent early to registrants—at least 8 days before the Institute opens.

The chairman wishes to record his deep appreciation of the admirable services, all rendered on a volunteer basis, by speakers and leaders in the 1939 Institute. In concluding this task, after participating in 5 of the 6 Institutes conducted by the Section, 2 of which he has served as chairman, he can only express the hope that his successor will derive equal benefit and pleasure from the experience. IRA V. HISCOCK

To Study Relationships Between Official and Nonofficial Public Health Nursing Agencies

Public Health Nursing Section

THE committee appointed to study relationships between official and nonofficial public health nursing agencies began its work in 1937, under the chairmanship of Miriam Ames, R.N. The progress report of the committee's activities was published in the 1937–1938 *Year Book* of the American Public Health Association, from which we quote the following:

REASONS FOR THE STUDY

In the first place, there is an awareness of the increasing importance of official agencies in the community health program and the fact that they are prepared to give services hitherto assumed without question by the private organizations. As a result we see the occasional overlapping of services in private and public agencies with an unwillingness on the part of one or the other, or both public health nursing agencies to relinquish part of these services. Moreover, when new work is undertaken there seems to be little if any joint planning between the agencies with a result that the purpose of both is either limited or defeated. Finally, there seems to be a lack of understanding of the functions and policies between the agencies which might be overcome by sharing this knowledge. It is to determine the philosophy underlying the work of the public and private agencies with a view to making practical recommendations for better working relations, that the committee has undertaken this study.

METHOD OF STUDY

The questionnaire method was selected as the best means of learning how official and nonofficial public health nursing agencies in urban and rural areas are developing satisfactory relationships through which coördination of nursing services in their communities is being brought about.

The limitations of the questionnaire method are well known and especially one seeking both factual material and expressions of opinion, as the schedule prepared by the committee.

RESPONSE TO QUESTIONNAIRE

The response has been most gratifying, over 77 per cent of the agencies replying to the letters and 70 per cent returning completed questionnaires. The schedules were mailed to 322 agencies employing public health nurses, selected from a list furnished by the N.O.P.H.N., with additional agencies suggested by state directors of public health nursing, committee members, and other interested persons. Two hundred and twenty-five completed questionnaires have been returned, representing 37 states and the District of Columbia: 101 official agencies—departments of health and boards of education; 105 nonofficial agencies—Visiting Nurse Associations, American Red Cross Chapters, Anti-Tuberculosis Associations; hospitals and other voluntary agencies which include public health nursing in their activities. Nineteen schedules were returned by organizations classified as joint agencies and supported by public and private funds.

INTRODUCTION TO SCHEDULE

Purpose of Study:

1. To learn how official and nonofficial agencies employing public health nurses in urban and rural areas are coördinating the nursing services in their communities.

2. To recommend practical procedures for defining and integrating the nursing services of health agencies in the community.

SCHEDULE

A Study of Relationships Between Official and Nonofficial Public Health Nursing Agencies

Agency reporting ....

Address ....

(Check type of agency) Official ☐ Nonofficial ☐ Joint ☐

Program (check nursing service rendered by your agency)

Maternity ☐ Delivery ☐ Infant and Preschool ☐ School ☐ Communicable Diseases ☐ Syphilis ☐ Tuberculosis ☐ Morbidity ☐ Health Centers ☐ Industrial Nursing ☐ Health Education ☐ Other

Total number of nurses employed

List communities served by agency

I. List agencies in your community employing public health nurses:

1.
2.
3.
4.
5.
6.

II. 1. Do any of the following councils exist in your community: (check)

Council of Social Agencies ☐

Does it have a Health Section? Yes ☐ No ☐

Health Council ☐

Nursing Council ☐

Other (Specify)

2. In which of these does your agency hold membership?

3. Has membership been of practical value to your agency in bringing about:

a. Better understanding and use of your services

b. (1) Adoption of uniform standards for personnel qualifications

(2) Uniform salary scale, vacation, hours of duty, etc.

c. Change of program or functions (describe):

d. Evaluation of agency (describe):

e. Financial support

f. Other

III. Is there any situation in your community which makes for an especially good relationship between official and nonofficial public health nursing agencies? Describe briefly:

IV. As an agency do you use any of the following methods for maintaining relationship with other health agencies in your community: (Check)

a. Do you have an agreement on personnel policies? Yes ☐ No ☐

b. Do you exchange monthly reports? Yes ☐ No ☐

c. Does your Board include representatives of other health agencies? Yes ☐ No ☐

d. Do you have a joint staff education program? With what agencies?

e. Do you have a plan for referral of cases to other agencies?

f. Do you exchange staff nurses?

g. Do you share supervisory services with other health agencies?

h. Do you provide nursing services for other health agencies? (Check)

Department of Health ☐
Board of Education ☐
Insurance Company ☐
Industries ☐
Public Welfare ☐
Other

i. Other

V. Do any of the following situations affect your relationship with other health agencies in your community? (Check)

a. Overlapping of territory ☐

b. Duplication of functions ☐

c. Lack of uniformity in standards of service ☐

d. " " " " records and reports ☐

e. " " " " personnel practices—in salaries, qualifications of nurses, hours of duty, etc. ☐

f. Other

VI. What new major health services involving public health nursing were started by your agency or any other health agency in the community in the past five years ('35–'39)?

2. What joint planning was done in initiating these services? (Describe)

VII. What suggestions have you to offer for the coördination of activities of official and nonofficial public health nursing agencies in community health planning?

Signed ....

Date .... Position in Agency ....

Time has not permitted tabulation and full analysis of the data. A preliminary review of the returned schedules reveals very interesting situations with helpful suggestions as well as showing the weak spots in community organization and planning for public health nursing services.

TRENDS

Certain trends are noted. An important one from the viewpoint of community planning is the increasing number of agencies, official and nonofficial, holding membership in their local council of social agencies or in a health council.

One hundred and eighty-three of the 225 agencies, or over 80 per cent, reported the existence of local councils of social agencies, with health sections organized in 144. One hundred and twenty-seven of the 183 agencies hold membership in their council of social

agencies. Some form of health council was reported by 68 agencies, and 50 of the reporting agencies hold memberships in such a council. Local nursing councils were reported by 54 agencies, and membership in nursing councils is held by 40 agencies. Certain agencies reported three types of councils in their community and memberships in all.

Question IV of the Schedule sought specific information as to the methods used by the agency in maintaining relationship with other health agencies in the community. In answer to the question—Do you have an agreement as to personnel policies? 69 agencies, or 30 per cent, reported "yes" while 127 reported no such agreement. Twenty-four failed to answer, and 4 answers were indefinite.

The question relating to the exchange of monthly reports revealed that 87 agencies, or 38 per cent, followed this practice. Eighty-two agencies, or 36 per cent, reported their board included representatives of other health agencies.

In answering the question regarding joint staff education, 78 agencies, or 34 per cent, reported in the affirmative. Supplementary statements reveal that there are many variations in these programs. A more detailed analysis of these statements will be given in the final report.

The majority (85 per cent) of agencies reported a plan for referral of cases to other agencies. Apparently the exchange of staff nurses is not a common practice as only 7 of the 225 agencies reported such a procedure. However, 37 agencies stated that they shared supervisory services.

Several agencies reported in the negative on the last 3 questions, i.e., "Joint Staff Education," "Exchange of Staff and Shared Supervisory Service," but added that they approved of such methods as an aid in the development and maintenance of satisfactory relationships.

Section V of the Schedule listed specific situations which influence agency relationship and at times seriously hinder the development of a well rounded community health program. A large number of the agencies failed to answer the questions in this section. Forty-four agencies reported that overlapping of territory is a problem in their community, while 54 reported that this situation does *not* exist. Fifty agencies reported that relationships are complicated by a duplication of function in agencies, and 51 answered this question in the negative.

Approximately 16 per cent of the 225 agencies reported lack of uniformity in standards of service, records and reports, and personnel practices, salaries, qualifications, hours of duty, etc. Twenty-one per cent reported no lack of uniformity. Sixty-three per cent of the agencies, however, failed to give any information.

Questions 3, 4, 6, and 7 have given the committee a wealth of information. Classification of this material has not been completed. However, to give you some ideas of the thinking of health officers and public health nursing directors, we are citing a few of their replies:

Question: Is there any situation in your community which makes for an especially good relationship between official and nonofficial public health nursing agencies? Describe briefly:

Answers: Health officer is a member of the board of the (V.N.A.) nonofficial agency as well as being director of medical supervision of the well baby conferences.

The V.N.A. is partially supported by the health department and administers the following for the health department—communicable disease placarding and nursing; venereal disease clinic and follow-up; parochial school nursing.

Members of the nonofficial agencies board and nursing committee are also members of the official agencies nursing committee.

Council of social agencies, nursing organizations, and friendly understanding between executives and staff nurses.

Yes. A thorough understanding of the functions of each agency; close coöperation; frequent conferences; personal contact of the staff and supervisors. The members of our different staffs use the same branch offices and in this way make very close personal contact.

The V.N.A. and we have always consulted about all important matters. We do not aim to be identical, but we standardize our technics, our public health nursing course, and share all that we can.

Mutual understanding and respect for each other's program. Friendliness of the executives of the various agencies.

Question: What suggestions have you to offer for the coördination of activities of official and nonofficial public health nursing agencies in community health planning?

Answers: Active participation in coördinating council and its health committee.

Joint review of services to detect duplication and careful consideration of plans for better coördination. Frequent personal contacts among staff on joint problems.

Uniformity of salaries. Availability of Social Security Scholarships for private as well as public agency.

Some kind of council for the pooling of the available resources and a complete survey of still unmet needs and a plan based thereon. The health section of the social planning council is working toward this end.

Full-time health officer; health council, representative of public and private agencies; less organizations in the community. Some communities have a tendency to be over-organized.

Thorough understanding of purpose and problems of agencies—frequent meetings to discuss programs.

That every effort be made to further understanding among other health agencies through frequent opportunities that occur or can be *made* to occur as suggested in this questionnaire.

None other than that all nursing agencies should function under one organization.

Locally—leadership in official agencies to meet that of private agencies. An illustration of specific problems—maternity—prenatal situation, which is confused by overlapping and serious gaps.

Joint participation in council of social agencies; of nursing council if one were formed, and by increased activity on part of council in community-wide planning.

Just keep at it!

NOTE: The committee wishes to thank the health officers, the school medical directors, the state directors of public health nursing and the nursing executives of all the agencies who have participated in this study.

We regret that it has not been possible to give a complete report at this meeting, and we sincerely hope that a further and more intensive study may be made of the valuable material already assembled.

JULIA L. GROSCOP, *Chairman*
GLADYS A. ADAMS
MIRIAM AMES
ETHEL G. BROOKS
MARY C. CONNOR
LAURA A. DRAPER
HELEN DUNN
LILLY HARMON
RUTH W. HAY
ANNE MCCABE
KATHRYN C. TRENT
ABBIE R. WEAVER

Age Adjustment of the Crude Death Rate*

Vital Statistics Section

SUMMARY

THE present indiscriminate use of the general death rate unadjusted for age is unsound, as this rate frequently fails to reflect levels or trends of mortality forces which are of primary public health interest. For example, the crude death rate shows signs of increase in the near future, although in most age zones death rates are still declining. To publicize the crude rate as freely as has been done in the past may bring serious consequences. To correct this condition the committee recommends:

a. That the use of the unadjusted total death rate be minimized and that, when used, it be referred to always as the "crude death rate";

b. That age-specific rates be used in place of the crude death rate whenever possible, even if very broad age groups be used;

c. That, before any single death rate, all ages, be adopted as standard, there should be further study and experiment, particularly in the light of age distributions found in the 1940 census;

d. That, if the age-adjusted (standardized) rate be used, the population of the United States for 1940 be taken as the standard population;

e. That due account be taken of other factors affecting the death rate, such as race, economic status, urbanization, etc. Moreover, it is essential that vital statistics be allocated for residence.

I. INTRODUCTION—OCCASION FOR THIS REPORT

There has, within recent years, been a growing realization that, due to the restriction of immigration, the persistent decline of the birth rate, and reduction in mortality in the younger ages, the average age of the population is rising to such a degree that the crude death rate must soon rise in spite of continued mortality savings from public health efforts, improved economic conditions, and the like. Figure 1 shows the recent and the predicted future course of the crude death rate, according to estimates of Dublin and Lotka.[7]

The rise in the crude death rate seems already to have begun in some states. Figure 2 shows that as early as in the decade 1920–1930, the crude death rate rose in Montana although age-specific rates declined in every age group except "55 and over." It can be shown that even had the death rate in the latter age group remained stationary, the crude death rate would still have risen slightly, due to the rising average age of the population.

It is obviously dangerous to use uncritically, and to encourage the public to reason from a death rate which may rise when actually mortality rates, in the most significant sense, are declining.

At the suggestion of Dr. E. S. God-

* Condensed report of the Committee on Forms and Methods of Statistical Practice.

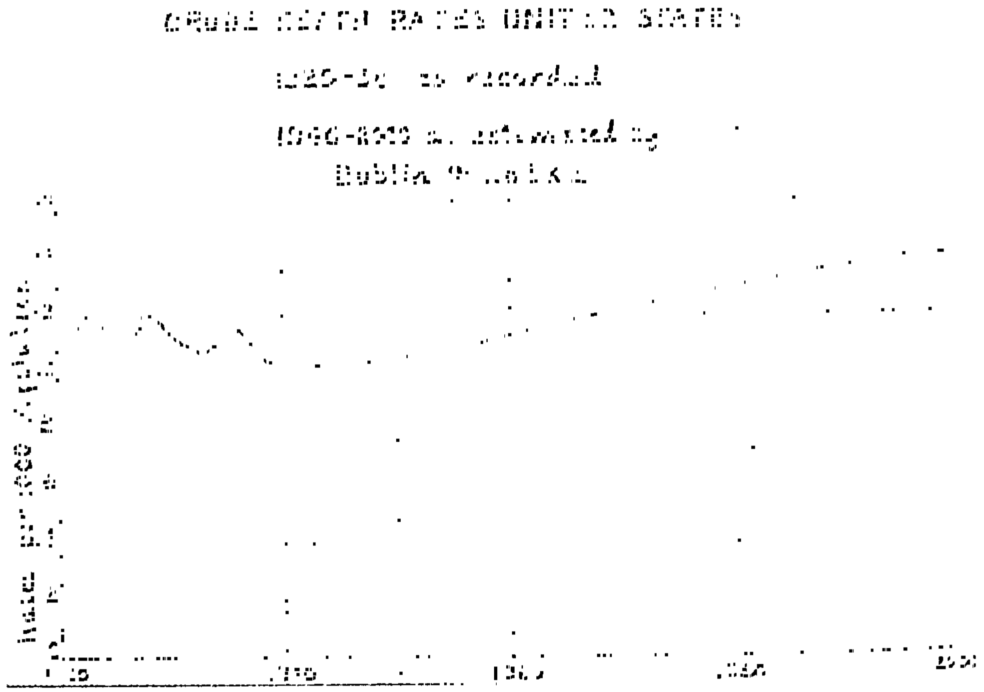

FIGURE 1

frey, President of this Association, a discussion of this problem was presented by Dr. L. J. Reed before the Conference of State and Provincial Health Authorities in April, 1939.[10] Subsequently the Vital Statistics Section of the American Public Health Association was asked to take action, which request was referred to this committee.

In an earlier report,[1] this committee discussed the age compensation of rates for specific causes of death, pointing out that it was particularly imperative to take account of age for diseases of old age and of childhood. For old age diseases, such as cancer, the use of the age group 45 or 55 and over was suggested; and for the communicable diseases of childhood, the age group under 15. For diseases centering in middle life and covering a wide age span, such as tuberculosis and typhoid fever, it was found less necessary to compensate rates for age of population.

The committee now turns to the more complicated problem of finding satisfactory substitutes for the crude death rate, all causes. As has been emphasized by many writers, the death rate is affected by other important factors aside from age of the population: notably race, sex, economic status, urbanization, the birth rate, etc. Account must also be taken of the completeness of registration and residence allocation. The reason for singling out age for special consideration is that the mortality rate varies so tremendously with age. The death rate is lowest at about age 10; namely, about 1.3 per 1,000 population of given age. At age 65 it is about 30 times as high; and after age 80 it rises from 100 to more than 800 times as high as the minimum.*

The principal extenuation for the over-use of the crude death rate in the past has been the difficulty of estimating age specific populations between cen-

* In the first year of life the rate is some 40 times as high as at age 10 but the curve drops very rapidly and is by the second birthday below the total rate, all ages. Crude death rates are, therefore, more sensitive to an excess or defect of elders than of infants; and a persistently falling birth rate eventually makes for a rising crude death rate.

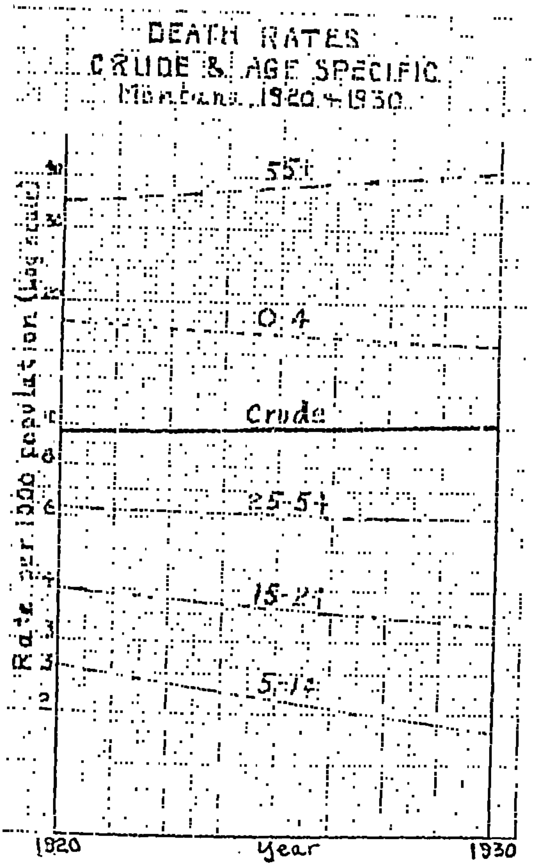

FIGURE 2

suses. During periods near censal years, however, this limitation does not exist. The approach of a census as of April 1, 1940, makes this discussion very timely. Furthermore, if as this and other associations have repeatedly urged, the federal census is taken every 5 years, annual estimates of population by age should be more easily available.

II. ALTERNATIVE PROPOSALS FOR TREATMENT OF THE AGE FACTOR

Of the various substitutes for the crude death rate, the following have been reviewed by this committee: Age-specific rates, age-adjusted or standardized rates of various sorts, the "equivalent average" rate, the life table death rate, and the standard mortality factor (S.M.F.). We shall first define the rates, and discuss their relative merits later.

a. *Age-specific rates*—Although age-specific tables are almost as old as the subject of vital statistics itself, no well established conventions exist as to groups which might best be used to substitute for the general death rate. Table 1 shows age distributions of the population, deaths, and death rates, which will be useful in the study of the problem at hand.

It is to be borne clearly in mind that, although the publication of mortalities in detailed age distributions is necessary and desirable, the immediate problem at hand is *not* to suggest standards for tabulation or to provide for an exhaustive study of mortality by age; the problem is to suggest as substitutes for the crude death rate the simplest practicable rates, such as might be used by a health officer who is asked at a meeting how the city death rate compares with the rural, or whether it is true that mortality in the state is rising.

TABLE 1

Age Distribution of Population, Deaths and Death Rates
U. S. Registration Area, 1930

Age Groups (Years)	*Deaths*		*Population*		*Death Rate per 1,000 Population*
	Number	*Per cent*	*Number*	*Per cent*	
Under 5	192,297	14.5	10,833,222	9.3	17.7
5–14	40,108	3.0	23,347,523	20.0	1.7
15–24	71,251	5.4	21,235,387	18.1	3.3
25–34	84,281	6.3	18,017,139	15.4	4.7
35–44	112,695	8.5	16,451,562	14.1	6.9
45–54	152,963	11.5	12,487,707	10.7	12.2
55–64	195,698	14.7	8,086,614	6.9	24.2
65–74	236,333	17.8	4,559,756	3.9	51.8
75+	239,771	18.1	1,841,590	1.6	130.2
Unknown age	1,843	0.1	89,831	0.1	.....
Total	1,327,240	100.0	116,950,331	100.0	11 3

There are, no doubt, situations in which to discuss only two or three age groups, such as "Under 45," "45–64," and "65 and over," would be satisfactory; and certainly this would be a great improvement over the use of the crude death rate. Further study is desirable, however, to determine the limitations of age ranges as broad as these.

Following is a breakdown into 8 groups which is found convenient for many purposes:

Under age 1	(Infancy)
1– 4	(Preschool period)
5–14	(School years)
15–24	(Youth; early working years)
25–44	(Principal working years)
45–64	(Middle ages)
65–74	(Early retirement period)
75+	(Old age)

For many purposes other combinations will be desirable; for example "Under 15" and "65 and over."

b. *Age-adjusted death rate* — This rate, which has been used widely for many years, especially in England, may be defined as the death rate a community would experience if its population had a standard age composition. The expression "age-adjusted" as here used is synonymous with "standardized by the direct method." Because the term "standardized rate" has been used with at least three meanings, the committee in its earlier report [1] recommended the use of the term "age-adjusted."

The procedure of age adjustment consists of (a) calculating the expected numbers of deaths in each age group of a standard population by multiplying each such population group by the relevant age-specific death rate of the local community, (b) summing these expected deaths, and (c) dividing by the total standard population in thousands. An example of the method of calculation is given in the previous report of this committee, and may be found in any textbook on vital statistics.

The principle of adjusting rates to a standard population may when necessary also be extended to include sex, race, and any number of other factors. As to race, the tendency in the United States has been to show separate rates instead of a single race-adjusted rate. Since death rates for Negroes are about 50 per cent higher than for whites, race specific tables are recommended by the committee for all areas with more than about 5 per cent Negro.

As is shown in the discussion below, the most troublesome element of the age adjustment problem is doubtless that of selecting and defending the population to be taken as standard. Table 2 shows the age distribution of popula-

TABLE 2

Four Proposed Standard Million Populations

Age Group	*England and Wales in 1901*	*Standard Proposed by International Statistical Institute, 1917*	*White Life Table Population, Registration States, 1930*	*United States White Population, 1930 Census*
0– 4	114,262	119,900	76,947	91,256
5– 9	107,209	206,900	75,595	100,712
10–14	102,735		75,034	96,944
15–19	99,796	183,200	74,345	92,949
20–24	95,946		73,285	87,016
25–34	161,579	147,900	142,622	153,359
35–44	122,849	120,500	135,941	141,397
45–54	89,222	93,900	125,201	107,844
55–64	59,741	70,800	106,447	71,425
65–74	33,080	40,500	74,745	40,748
75+	13,581	16,400	39,838	16,350
Total	1.000,000	1.000,000	1.000,000	1,000,000

tions which have been used or recommended as standard by various authorities. To this list should be added the 1940 United States population after the next census. The table shows that for the earlier years there are larger proportions of young children and smaller proportions of old persons than for more recent populations. The life table population shows the largest proportion of old persons of all (the proportion in the group "75 and over" was nearly three times as large in the life table population of 1930 as in the 1901 English population).

c. *Standardization, "indirect method"* *—This method of age compensation has long been used in the British Registrar General's office.[2a, 4a, 5b] The essence of the Registrar General's method is the calculation of a correction factor which is multiplied into the crude death rate. This correction factor, termed "standardizing factor," is the ratio:

$$F = \frac{\text{Index death rate in the standard population}}{\text{Index death rate in the local population}}$$

where the index death rates are obtained by using the following formula:

$$I = \frac{\text{Sum (Standard age-specific death rates x indicated age-specific population)}}{\text{Total indicated population}}$$

The standard age-specific death rates generally used are the national death rates. The "indicated" population is for the numerator of F the standard population and for the denominator of F the local population.

Although numerically the results by the direct and indirect methods are frequently much the same, the results do differ appreciably at times.[4b, 5c] The two concepts have different meanings which should not be confused.

* Since this report was presented, a paper by Doering and Forbes[12] has come to hand, which discusses the direct and two indirect methods of age adjustment.

d. *Equivalent average death rate*—This rate, proposed by Yule,[8a] and favored also by Pearl,[5b] is a simple arithmetic average of age-specific death rates. This rate is essentially an age-adjusted rate calculated by a short method. If the age-specific rates are taken over equal age bands, for example 10 year age groups, the effect is equivalent to assuming a standard population with an equal number of persons in each age band. This overweighting of the old ages can, however, be offset by taking broader bands for the older ages as illustrated in Table 3.

TABLE 3

Calculation of Equivalent Average Death Rate New York State: 1930

Age	*Deaths*	*Population*	*Death Rate per 1,000*
0– 4	16,398	989,294	16.57
5–14	3,621	2,163,025	1.67
15–24	6,074	2,210,342	2.75
25–54	42,055	5,637,209	7.46
55+	79,305	1,588,196	49.93
Total			78.38
Average			15.7

e. *Life table death rate*—This is the rate which would ultimately prevail in a stationary population; that is, one in which the births per year and the present age-specific mortality rates remained stationary; and for which there is no migration into or out of the population. The life table death rate is the reciprocal of the expectation of life at birth; e.g., if the expectation is 62 years, the life table death rate is 1,000/62 or 16.1 per 1,000 population. Life table death rates are higher than death rates based upon actual populations of the present or past because the life table populations show relatively large proportions of old persons. Reed and Merrell,[6] and Doering and Forbes[12] have recently published short methods of calculating life tables. It is said that an abridged life table can be worked out by a clerk in somewhat less than 2 hours by the Reed-Merrell method.

An even shorter approximate method

of calculating the life table death rate is available through adaptation of a formula of Dublin and Lotka[3] as follows:

$$\text{Life table death rate} = \frac{1{,}000}{78.337 - 0.0174D_a},$$

where D_a is the age-adjusted death rate calculated to the population of England and Wales, 1901 as a standard. The equation could obviously be modified to suit any other standard population.

f. *Standard mortality ratio (S.M.R.)*—A number of indexes of this type have been used, particularly in connection with the study of occupational mortality. They are in the nature of ratios between actual and age-compensated mortalities of some sort. Although useful, they are not actually death rates and, therefore, are not considered here as substitutes for the crude death rate.

The relationships between the various rates discussed above, and their time trends are shown in Figure 3 and Table 4 for New York State. The age-adjusted and average specific ("equivalent average") death rates shown declined more rapidly, and the life table death rate less rapidly, than did the crude rate from 1900 to 1930.

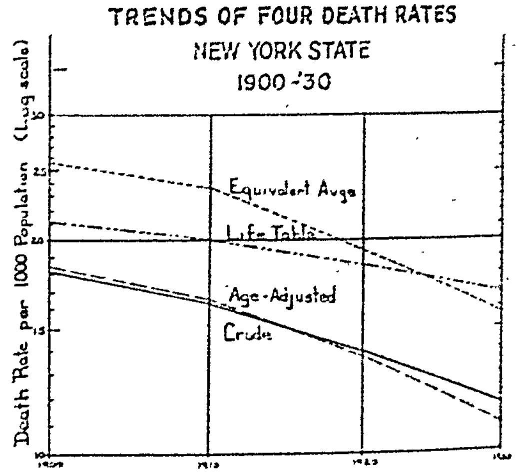

FIGURE 3

III. DISCUSSION—CHOICE OF A STANDARD FORM OF RATE

Each of the proposed substitutes for the crude death rate obviously has its peculiar advantages, and no one rate can be adjudged best for all purposes or for everyone interested in death rates. Your committee feels that its recommendations should consider primarily the following factors:

a. The day-to-day needs of health officers and vital statistics bureaus. Rates used by research workers can hardly be prescribed;

b. Simplicity of concept of the rate, and its ability to be explained to the public;

c. Time required for calculation, since federal and state offices must calculate rates for many areas.

In the light of the criteria listed we turn to the advantages and disadvantages of the various rates described above. Of the mortality indexes studied, age-specific or "age-limited" rates are unquestionably the most efficient in promoting comparability of rates so far as age is concerned; in fact, the acceptability of the alternative methods is commonly gauged by the degree to which they give the same general impression as do age-specific rates.[8a] That age-specific rates are eminently suitable for general used is proved by the present popularity of the infant mortality rate. The time required for calculation will naturally depend upon the number of age zones which are employed.

TABLE 4

Trends of Four Types of Death Rates[a]
New York State: 1900–1930

Year	*Crude*	*Age Adjusted*[b]	*Equivalent Average*[c]	*Life Table*
1900	18.1	18.3	25.7	21.1
1910	16.2	16.5	23.7	20.0
1920	13.8	13.7	19.3	18.4
1930	11.7	10.9	15.7	16.7
30 yr. decline	6.4	7.4	10.0	4.4
Per cent decline	35.3	40.4	38.9	20.9

[a] Rates per 1,000 population. Data for crude, life table and age-adjusted rates by courtesy of Dr. J. V. DePorte.
[b] Age-adjusted rates calculated to population of England and Wales, 1901, as standard.
[c] Average of 5 age-specific rates: 0–4; 5–14; 15–24; 25–44; 45+.

The committee recommends experimentation with various combinations of the age groups suggested earlier in this report, and hopes to discuss this subject further at the next annual meeting.

In all of the remaining rates, which seek to cover the entire age scale, standard populations enter directly or implicitly. This produces the difficulty that comparisons depend to an appreciable degree upon the particular population which is selected as standard. For example, if the standard population has a relatively *small* proportion of old persons, as is the case with the 1901 population of England and Wales, then those communities are favored in which the death rates in old age are exceptionally high. If, on the other hand, the standard population has relatively *large* proportions of old persons, as is the case with life table populations, then those communities are favored in which death rates in old age are relatively low. To illustrate the effect of the rôle of the standard population, Reed [10] cites the result that, when the death rates of two selected areas, A and B were standardized (age-adjusted) to the population of A as standard, Maryland had the lower rate of the two; but, when the population of B was taken as standard, then B had the lower rate. He, therefore, argues in favor of age-specific rates against any standard form of rate, all ages.

The issue may also be viewed in this way: If a man, wanting to compare prices, walked into a fruit store and asked for the average price of fruit, he would doubtless be asked "What kind of fruit?" and, if he replied "All of your fruits," he would probably be regarded as mildly insane. He would be told that no fruiterer would think of working out such a meaningless average, since fruits vary tremendously in price, and no two stores carry the same varieties. No doubt the very sensible suggestion would be made that the inquirer had best ask concerning the fruits in which he is especially interested instead of attempting to average the whole scale from bananas to pomegranates.

Age-specific mortalities of human beings differ even more than do the prices of fruits; and the blind over-use of death rates, all ages, with consequent neglect of the enormously more informative age-specific rates, is not justifiable. Nevertheless, as many persons will doubtless feel that at times they must use a single rate for all ages, we consider next the pros and cons of the various death rates, all ages.*

The age-adjusted rate requires somewhat more time for calculation than age-specific rates but requires less space for publication. That it is explainable to casual users is evidenced by its use for many years in England and in some offices of the United States. In the discussion on death rates before the Royal Statistical Society in 1922 [8] Yule and others felt that the age-adjusted rate came reasonably close to giving an impression comparable to that obtained from averaging age-specific rates. If this rate is used, the committee suggests that, for general purposes, the population of the United States in the census of April 1, 1940, be taken as the standard. To use the English standard of 1901 would, in the United States, introduce obvious difficulties without adequately compensating advantages. In some cases it may be advantageous to use as a standard population the sum of the areas to be compared.

As to the choice between the direct and indirect methods of standardization,

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* The primary purpose of rates is to permit comparison of mortalities, usually comparisons between different times or places. Some rates which may be reasonably suitable for geographic comparisons are not always so successful for time comparisons since "standard populations" become obsolete with time. For most time series, age-limited rates seem almost necessary.

it is difficult to make a general recommendation. Some statistical writers appear to feel that for most purposes the direct method is logically the more appropriate.[4, 5, 11] On the other hand, in the case of small local populations, the effect of sampling variability of age-specific death rates will be smaller for the indirectly adjusted death rate, since the latter uses rates based upon national or other large populations. Moreover, it is a great time-saver when rates for many areas must be calculated. The committee feels that the choice between these two methods should be made in the light of the immediate problem at hand. It appears that the results by the two methods are usually in fairly close agreement; but under some conditions there may be differences of about 5 per cent.[4b, 5c]

The life table death rate has the interesting quality that it is the reciprocal of the expectation of life. It also obviates the arbitrarily selected standard population, and depends upon the respective populations which would ensue in the several areas if the current mortality rates and the birth rate remained stationary, migration being absent. The life table population structure, therefore, differs from one place to the next. If one of the short methods referred to above be used, the time required for calculation of the life table death rate is not a serious obstacle to its use.

Yule and others[8a] have cited against the life table death rate its relative sluggishness (see Figure 3). Thus, when certain English age-specific death rates were doubled, the life table rate increased only by about 50 per cent, whereas the age-adjusted death rate was very nearly doubled, as seems desirable in a mortality index.

With the equivalent average death rate there has been so little experience that this committee has very little basis for a judgment. Philosophically this rate appeals to some who feel that, since our interest resides fundamentally in mortality rates of the several age zones, it seems quite logical to use an average of those rates if we must use a single rate, all ages. The component age zones could perhaps be so arranged to give proper weight to the younger ages which are of primary public health interest. One advantage of this rate would be that, since the population implicitly adopted as standard need not enter explanations, and makes no pretense of approximating the actual population, there would be less popular insistence upon bringing the standard population up to date from time to time—a difficulty which, for example, bedevils the English Registrar General and the New York State Registrar at the present time. Without necessarily endorsing the equivalent average rate, the committee commends it for study.

ACKNOWLEDGMENTS — The committee expresses its indebtedness to Dr. E. S. Godfrey, President of this Association, and Jessamine Whitney, Statistician of the National Tuberculosis Association, for stimulating this discussion; to Dr. J. V. DePorte and Elizabeth Parkhurst for statistical data; to Dr. L. J. Reed, Dr. H. L. Dunn, and Dr. Forrest Linder, and a number of volunteer correspondents, for valued counsel; and to Anne K. Carroll and other members of the staff of the Bureau of Vital Statistics of the Maryland State Health Department for clerical and statistical assistance.

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Residence Allocation

Vital Statistics Section

THE activities of the committee during the past year were limited to correspondence and personal discussion among some of its members—a meeting of the entire committee was impracticable because its membership is widely scattered. The outstanding event bearing on the problem with which the committee concerned itself has been the adoption of the new forms of the standard birth, death, and stillbirth certificates. In these forms the items relating to residence are so clearly worded that the difficulties to which attention was called in the report which the committee made last year should in large measure, if not altogether, be eliminated.

Now that the interchange of transcripts of birth and death certificates among the several states has been placed on a permanent basis, the registration office of every state should concern itself with residence allocation within its borders. It is essential that birth and death statistics of the administrative subdivisions of a state should be expressed in terms of resident data. If facilities permit, these figures could well be supplemented by tabulations on a recorded basis. Data relating to accidents could be tabulated with advantage also according to place of occurrence of the accident.

A further and very desirable development would be to furnish city and county departments of health with information relating to births and deaths among residents of the territories under their jurisdiction. This could be done either by sending periodically to these health departments transcripts of nonresident certificates, or if this should prove to be impracticable, the state office might supply the local departments with lists of births and deaths containing a few of the basic facts relating to each.

The extension of the system of residence allocation along the lines indicated above will undoubtedly bring up various questions of a practical or theoretical nature. The consideration of such questions and suggestions for their solution is in the opinion of the committee the most effective way in which it can further serve the members of the Vital Statistics Section.

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Study of Methods of Estimating Population

Vital Statistics Section

EVERY state and municipal department is directly or indirectly concerned with the size of the population it serves. The dependence of the activities of a health department upon population data is self-evident. Under normal conditions, statisticians are able to furnish public health administrators with reasonably accurate population estimates, but the years following the last federal census have been decidedly abnormal and none of the previously used methods for calculating post-censal populations can be used generally. The main factors which have created this condition are the drop in the birth rate, the practical stoppage of immigration, and the abnormal internal migration.

It is logical, perhaps, for theoretical statisticians to say that, since satisfactory estimates cannot be made, health departments should discontinue the compilation and publication of monthly and annual rates. But one of the functions of a state or city department of health is to inform the people regarding the relative natality and mortality in the area it serves. It has taken years of educational work to persuade cities and counties to discontinue making their own estimates and to accept and use as official, estimates and rates computed in a uniform way by state departments of health. If these departments were to discontinue this activity the result would be a variety of estimates officially presented by the various municipalities. Although some of these figures might prove to be no worse than any which the state department might compute, in many instances there would be the natural temptation to depict local conditions in as favorable a light as possible.

The least troublesome way of reducing a death rate is by increasing the population. As an instance, one thinks of a city in New York State which for many years published death rates based on an estimated population of 100,000 while according to the federal census, its population for half a century fluctuated around 70,000. This city finally agreed to abandon its claim to a fictitious population and employ the estimate furnished by the State Department of Health. It is thus clear that, whatever the difficulties, birth and death rates will have to be computed, and it is the responsibility of the state department of health to eliminate from these figures all purposeful bias.

It is this consideration that motivated the Section in creating a Committee for the Study of Methods of Estimating Population. The committee set itself the task of investigating procedures for making inter- and post-censal estimates of the population of counties, cities, villages, and rural areas, these procedures to be considered as complementary to the methods used by the Bureau of the Census in estimating the population of states.

In making its first report, the com-

mittee is painfully conscious of the meagerness of its accomplishment. The two meetings which were held since last December and the interchange of views, personally and by correspondence, with research workers in population and allied fields were constructive in a rather negative way. The members of the committee find themselves in general agreement regarding the various processes with which they themselves have so far experimented or which have been expounded in the literature. They believe that directory listings, the number of telephones, gas, electric and water meters in use, and similar sources of local information can serve as checks on estimates already computed and not as bases for original calculations.

The official statistics outside the sphere of public health which seem to hold the greatest promise are those of school enrollment, provided they are dependable, collected periodically and tabulated in sufficient detail as to age and residence of the pupils. Such figures can produce reliable measures of migration into and out of the municipalities of a given state. However, school statistics are, as a rule, decidedly sketchy, and there is little prospect of improvement in the immediate future.

The committee wishes to record most emphatically its conviction that, short of a permanent register of population, an integral solution of the problem cannot be postulated without a quinquennial federal census. But even if the Congress of the United States were to adopt the urgent recommendation repeatedly made by informed and competent public opinion and provide for a census to be taken every 5 years, annual estimates would still be needed.

The committee is not prepared at this time to propose a definite program or to make specific recommendations. It is ready to continue its studies if this be the wish of the Section.

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Utilization of Vital Statistics Data During the 1940 Census Period*

Vital Statistics Section

THE Committee on Utilization of Vital Statistics Data During the 1940 Census Period submitted a report of the Vital Statistics Section at its meeting on October 20, 1939. The report called the attention of members of the Section to the opportunities which the 1940 census would afford state, county, and city health departments to utilize vital statistics records more effectively. The committee made 8 recommendations for taking advantage of the opportunities that would be presented with the taking of a new census. The report recommended that state bureaus of vital statistics plan to utilize the information on completeness of birth registration which will be available as a result of supplementary information which will be secured by census enumerators in connection with the coming census.

It is recommended that the bureau of vital statistics of every state arrange to furnish local health departments within the state with nonresident data on birth and death certificates. It was pointed out that such intrastate transfer of nonresident data was even more important than the exchange between states.

All states were urged to publish, particularly during the census period, age specific death rates for all causes and for the more important causes of death for various subdivisions of the state. The report pointed out the importance of recomputing, on the basis of the 1940 population figures, rates published during the decade 1930–1939. The report also recommended the computation of life tables based on residence data for the large cities and contrasting urban and rural areas.

The report suggested that many states would find it profitable to make dual tabulations for 1940 of causes of death classified on the basis of both the 1929 and 1938 revisions of the *International List of Causes of Death.* States with satisfactory occupational data on death certificates were urged to undertake the publication of special tables of occupational mortality for all causes and for the more important causes of death for the census period. Finally, the committee called attention to the report of the Committee on Census Enumeration Areas of the American Statistical Association which states that 62 communities will be in a position to secure census tract tabulations for the 1940 census. The committee urged that these communities make tabulations of their vital statistics for the census period by census tracts and by combinations of such tracts according to their social and economic characteristics.

* Abstract of Report.

The complete report of the committee will be published by the Division of Vital Statistics of the Bureau of the Census as a "Vital Statistics—Special Report." The plans of the Division of Vital Statistics of the U. S. Bureau of the Census will be included in this publication.

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CONTENTS

Continued on page vi

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Continued on page viii

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Contents—Continued PAGE

INDEX TO ADVERTISERS

American Journal of Public Health
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Volume 30 March, 1940 Number 3

Epidemiological Studies of Tuberculosis*

L. L. LUMSDEN, M.D.,† AND W. P. DEARING, M.D.
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MASS production now appears in order in the field of epidemiological studies. Henceforth, great discoveries such as were made in this field during the 18th and 19th centuries are not to be expected to derive from narrowly limited individual observation and study of one or a few basic facts or conditions. Broad gauge open-minded observation, thorough study of all facts or conditions reasonably considered likely to prove salient, definite—but duly elastic—long-pull program planning, and organized effort now are needed to give promise of satisfactory accomplishment in this as in many other lines of scientific endeavor. Old tilled fields must be resurveyed, new unbroken fields explored, and every trail followed until found false, promising, or true.

The epidemiological studies of tuberculosis inaugurated by the U. S. Public Health Service and conducted intensively since July 1, 1936, with the coöperation of the State Health Departments of Alabama and Tennessee, the local health departments directly concerned, and the Tennessee Valley Authority, were planned and organized and have been and are being carried out in accord with prescribed epidemiological principles.[1] This paper is intended as a progress or, rather, a summary report of procedures and findings to date. A detailed report will be prepared for publication by the U. S. Public Health Service in due time.

OBJECTIVES

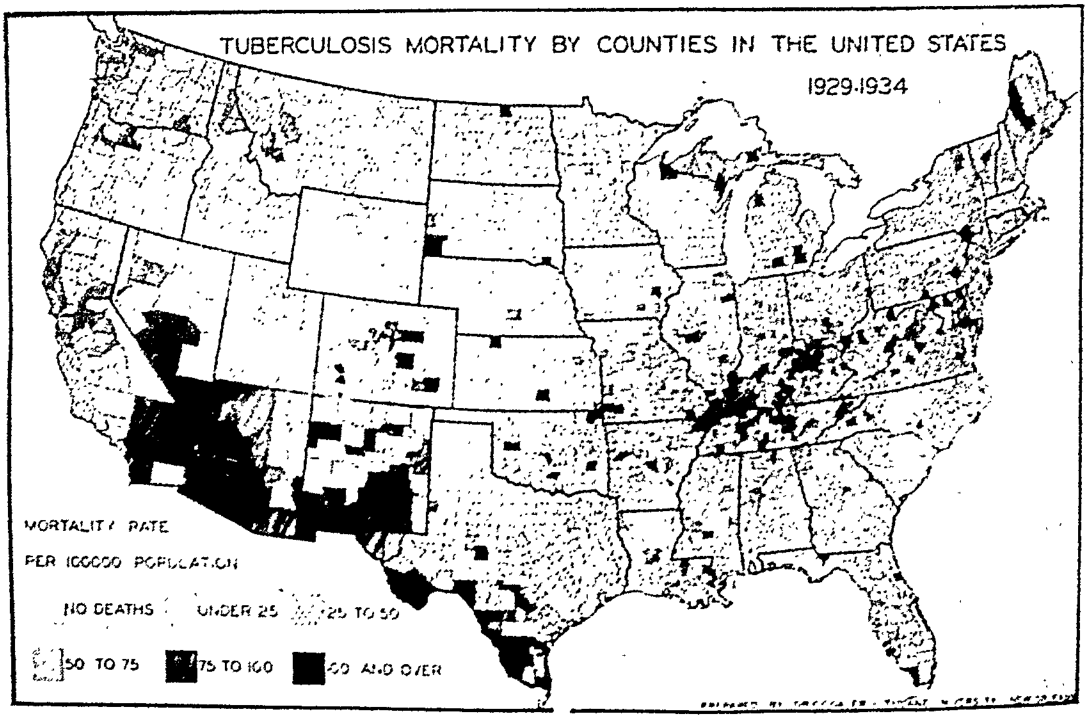
The main objectives of the studies are: (1) the development of needed additional practical knowledge regarding the causation and means for prevention of tuberculosis in general, and (2) the determination in particular of the factors which in kind or degree operate to cause the notable differences established by statistical studies[2] in the geographical, age, sex, and race distributions of tuberculosis mortality among persons.

PROCEDURES AND FINDINGS

The program of detailed procedures was developed on a basis of statistical evidence, especially the recorded tuberculosis mortality rates in different areas of our southeastern states. Among all

* Read before the Epidemiology Section of the American Public Health Association at the Sixty-eighth Annual Meeting in Pittsburgh, Pa., October 20, 1939.

† Since these studies were made Dr. Lumsden has become Acting Director, Division of Preventable Diseases, State Department of Public Health, Nashville, Tenn.



the states, Tennessee and Kentucky have had during the last decade the highest rates of mortality attributable to tuberculosis of local origin. In these two states, the comparatively high rate regions are in Middle Tennessee and in the Kentucky Blue Grass, which regions interestingly appear, according to the usual methods of evaluation, among the most prosperous and progressive in our southeastern states. In the areas extending in any direction from the high rate center in Tennessee and Kentucky —north, east, south, or west—the tuberculosis mortality rates are markedly less (see Map I).* Among white persons in Alabama, the rate in the southern third of the state is less than one-half that in the northern third, while in Indiana the rate is very considerably higher in the southern than in the central and northern thirds of the state.

In the southeastern coastal plain, generally, the rate is remarkably low. In the region to the north of it, comprising northern parts of Arkansas, Mississippi, Alabama, and Georgia, western parts of South Carolina and North Carolina, and most of Tennessee, Kentucky, Virginia, Maryland, and Delaware, the rate is high as compared with that for the United States as a whole. A line drawn to separate these two regions, herein defined as the high and low tuberculosis mortality rate regions, coincides remarkably with a line separating the Southern Pine Forest region from the Central Hardwood Forest region and also with one indicating the southern limit of exposure of the paleozoic rocks.

This geographical distribution of tuberculosis mortality presented a challenging problem. We undertook to study it on a broad scale. Coffee County in Southeastern Alabama and Giles County in South-central Tennessee, representative respectively of the low and the high tuberculosis regions, were selected for intensive detailed studies. Both are very largely rural, agricultural counties. The distribution of their populations by land area, town, village, and open country districts, and by race and nationality is much the same. Topography, geology, soil forma-

* Prepared by C. C. Dauer and published originally in *Public Health Reports*, 52:70 (Jan. 15), 1937.

tions, and meteorological conditions present, on the other hand, readily obvious dissimilarities in the two counties. From general indications, Giles County appears considerably more prosperous than Coffee County. The mortality statistics, however, show that, for the 10 year period 1929 to 1938, the average annual death rate per 100,000 from tuberculosis among white persons was 113.9 in Giles and 13.2 in Coffee County, and among Negroes, 210.2 in Giles and 66.7 in Coffee County. A difference of about 9 to 1 for whites of generally similar European antecedents, and of about 4 to 1 for Negroes of largely or wholly identical African antecedents, obviously means a definite and substantial difference in salient factors operating either for predisposition to or for protection against tuberculosis mortality.

House-to-House Survey and Family Canvass—To check on the statistical records and surface indications, and to determine as nearly as practicable the economic status and living conditions (social, sanitary, and dietary), family origins and traits, and the morbidity and mortality, a survey and canvass was made of all the homes in the two counties—6,319 in Coffee County and 5,937 in Giles County. This survey and canvass was made by a force of trained, experienced, carefully selected public health nurses, whose work was alternated between the two counties so as to apply the same personal equations in each. A comprehensive questionnaire calling for every datum regarded as likely to prove of value was filled out for every home. The duration of the visit to a home averaged about 1½ hours. With notably few exceptions, the families were thoroughly cordial and coöperative.

The large mass of detailed data collected by the canvass is yet in process of tabulation and can be presented only in small part in this paper. Among the determinations of special interest were that the actual morbidity and mortality rates from tuberculosis during the 6 or 7 year period immediately preceding the canvass had been slightly higher, and that the difference between the rates for the two counties was even somewhat greater than had been indicated by the official mortality statistics. There was found to be no significant difference between the two counties as to ancestral origins and general character of the population. Economic status, comforts above the necessity level, food consumption, and housing—especially with respect to crowding—were found to average better among the families of Giles County than among those of Coffee County. Detailed data on household populations and per capita consumption of different classes of foods are presented in Table 1. The per capita consumption of milk was found surprisingly high in both counties, but to average very considerably higher in Giles County. Giles led in the consumption of lean meats, eggs, tomatoes, and citrus fruits and was slightly behind in the consumption of green, yellow, and leafy vegetables. Coffee County led in consumption of starchy foods, syrup, and fat meat—staples of the poor. The sanitary ratings with respect to excreta disposal and domestic water supplies for the two counties were not far apart.

The family records of illness indicate a much higher incidence of respiratory diseases besides tuberculosis in Giles and a much higher incidence of hookworm disease and pellagra in Coffee County. General nutrition of school children appears to average very considerably better in Giles County.

Tuberculin Testing and X-ray Examinations—With a view to determining whether the difference between the two counties in tuberculosis mortality is due to a difference in extent and degree and kind of distribution of the specific in-

TABLE 1

Comparison of Food Consumption
Giles County, Tenn., and Coffee County, Ala.
Per Capita per Week by Color, Tenure, and Residence

Tenure and Residence		*Total* *Households*	*Total* *Population*	*Ave. No. Persons per HH*	*Flour and Corn lbs.*	*Sweet and Irish Potato lbs.*	*Tomato and Citrus lbs.*	*Gr., Yel. and Leafy Veg. lbs.*	*Sugar lbs.*	*Syrup lbs.*	*Milk* qts.*	*Eggs No.*	*Lean Meat lbs.*	*Fat Meat lbs.*
						White								
OWNERS														
Country —	Giles	1,953	7,842	4.02	5.20	2.17	1.28	2.07	1.23	0.69	6.99	5.55	1.48	1.29
	Coffee	1,316	5,855	4.45	5.54	2.07	0.97	2.10	1.04	0.78	6.69	5.31	1.34	1.27
Town —	Giles	260	868	3.34	4.26	2.11	3.12	2.45	1.28	0.43	4.30	8.32	2.03	1.22
	Coffee	424	1,674	3.95	4.63	1.59	2.00	2.70	1.13	0.51	4.66	8.69	1.59	1.08
TENANTS														
Country —	Giles	1,412	6,582	4.66	5.35	1.75	0.91	1.56	0.98	0.59	6.57	3.54	0.93	1.05
	Coffee	1,641	8,041	4.90	5.74	1.80	0.60	1.69	0.85	0.82	4.97	3.43	0.89	1.13
RENTERS														
Country —	Giles	524	2,310	4.41	4.98	1.95	1.26	1.59	1.09	0.57	5.85	4.77	1.14	1.08
	Coffee	1,120	5,611	5.01	5.44	1.92	0.77	1.76	0.89	0.81	5.29	3.99	0.91	1.16
Town —	Giles	418	1,714	4.10	4.36	1.89	1.65	1.63	1.02	0.45	2.80	5.95	1.27	1.10
	Coffee	561	2,300	4.10	4.65	1.68	1.50	1.97	1.00	0.66	3.27	6.33	1.46	1.03
						Colored								
OWNERS														
Country —	Giles	331	1,480	4.47	5.20	1.48	0.43	1.75	0.93	0.55	3.91	2.12	0.86	1.06
	Coffee	106	532	5.02	6.06	1.38	0.31	1.78	0.73	0.92	3.98	2.02	0.89	1.10
Town —	Giles	131	444	3.39	4.31	1.53	0.68	1.57	0.96	0.34	1.60	3.10	1.08	1.14
	Coffee	134	598	4.46	4.43	1.32	0.48	1.84	0.77	0.74	1.79	3.10	0.87	1.05
TENANTS														
Country —	Giles	590	3,040	5.15	4.99	1.21	0.34	1.53	0.85	0.48	3.79	2.03	0.77	1.01
	Coffee	679	3,451	5.08	5.29	1.08	0.37	1.38	0.80	1.50	2.55	1.48	0.80	1.15
RENTERS														
Country —	Giles	84	391	4.65	4.51	1.04	0.47	1.39	0.80	0.42	2.76	1.72	0.81	0.91
	Coffee	104	504	4.85	5.26	1.21	0.35	1.44	0.82	0.93	2.79	1.88	0.75	1.15
Town —	Giles	234	884	3.78	4.03	1.34	0.55	1.23	0.80	0.29	1.06	2.30	0.83	0.99
	Coffee	234	959	4.10	4.14	1.24	0.46	1.44	0.68	0.82	1.18	2.27	0.80	1.02

* Includes whole, skim, sour, and condensed milk.

fectious agent, an extensive program of tuberculin testing and x-ray examination of chests was carried out. This work among children attending schools in the two counties was discussed in detail in a paper presented at the annual meeting of this Association last year.[3] In addition to the examination of children in schools, clinics were held in suitable locations scattered over the two counties for the purpose of examining a cross-section of the adult and preschool populations. Identical methods of advertising the clinics and soliciting attendance were employed in both counties.

The results of the tuberculin testing of a total of 10,355 persons in the two counties—5,674 in Giles and 4,681 in Coffee County—are shown in Table 2. The testing of the school age children was done mostly with a preparation of tuberculin PPD made by one company (" A "), whereas the testing of the preschool children and adults was done with a preparation of tuberculin PPD made by another company (" C"). The latter preparation had been found by duplicate tests on a group of school children to give a much larger percentage of positive reactions than the former.[3a]

Among white persons tested with one or the other of these preparations, the percentage of positive reactors among those under 20 years of age was slightly higher in Coffee County, but among those over that age, the percentage of

positive reactors was higher in Giles County. Among the colored, the percentage of positive reactors was higher in Giles County for every age group except that under 5 years. For all ages, the percentage of positives was 25.2 among whites and 43.9 among colored in Giles County, as against 20.4 among whites and 32.5 among colored in Coffee County. It is interesting that, if the incidence of reactions two plus or larger only is compared, the differences between Giles and Coffee Counties are magnified for every age group.

X-ray pictures of the chests were made on all of the persons tuberculin tested, regardless of tuberculin reaction. All films were read by the same roentgenologist without knowledge of the tuberculin reaction or clinical history. It was recognized that this procedure is not definitive for diagnosis, but the objectivity of the method tends to produce greater uniformity of interpretation.

The findings from the x-ray examination of 5,646 persons in Giles County and of 4,650 persons in Coffee County are shown in Table 3. The survey showed a much higher incidence of lesions certainly or probably tuberculous in Giles than in Coffee County, but the difference between the two counties in incidence of cardiac and nonspecific pulmonary lesions was not so great.

Most striking was the finding of an incidence of focal pulmonary calcification 40 times as high among white persons and 30 times as high among colored persons in Giles County as in Coffee County. With a view to defining the geographical area of high incidence of this condition, our survey was extended to 16 additional counties—3 in Alabama, 3 in Tennessee, 6 in Kentucky, 2 in Ohio, and 2 in Indiana, covering all together 7,472 white school children. Approximately 500 children, usually the entire attendance of one or

TABLE 2

Comparison of Reactions to 0.0005 mg. of Tuberculin PPD
Giles County, Tenn., and Coffee County, Ala., by Race and Age

Age in Years	Total Tested		Tuberculin Positive: Total, No.		Total, Per cent		2 Plus or More, No.		2 Plus or More, Per cent	
	Giles	Coffee	Giles	Coffee	Giles	Coffee	Giles	Coffee	Giles	Coffee
White										
0– 4	141	165	11	12	7.8	7.3	3	0	2.1	0.0
5– 9	940	649	60	85	6.4	13.1	30	8	3.2	1.2
10–14	1,247	914	167	158	13.4	17.3	101	26	8.1	2.8
15–19	745	615	141	113	18.9	18.4	85	11	11.4	1.8
20–29	460	467	179	118	38.9	25.3	120	26	26.1	5.6
30–39	333	396	193	109	58.0	27.5	133	34	39.9	8.6
40–49	252	247	159	84	63.1	34.0	105	32	41.7	13.0
50–59	161	147	111	57	68.9	38.8	63	10	39.1	6.8
60 Plus	111	89	87	42	78.4	47.2	49	16	44.1	18.0
Total	4,390	3,689	1,108	778	25.2	20.4*	689	163	15.7	4.0*
Colored										
0– 4	85	32	14	6	16.5	18.8	4	0	4.7	0.0
5– 9	286	218	52	32	18.2	14.7	32	10	11.2	4.6
10–14	340	293	95	67	27.9	22.9	68	16	20.0	5.5
15–19	186	148	83	56	44.6	37.8	57	25	30.6	16.9
20–29	130	87	88	40	67.7	46.0	59	21	45.4	24.1
30–39	76	77	61	40	80.3	51.9	44	24	57.9	31.2
40–49	68	67	60	38	88.2	56.7	48	30	70.6	44.8
50–59	55	43	53	26	96.4	60.5	38	21	69.1	48.8
60 Plus	58	27	50	17	86.2	63.0	38	11	65.5	40.7
Total	1,284	992	556	322	43.9*	32.5*	388	158	30.8*	15.7*

* Total per cent positive adjusted to age distribution of Giles County white population tuberculin tested

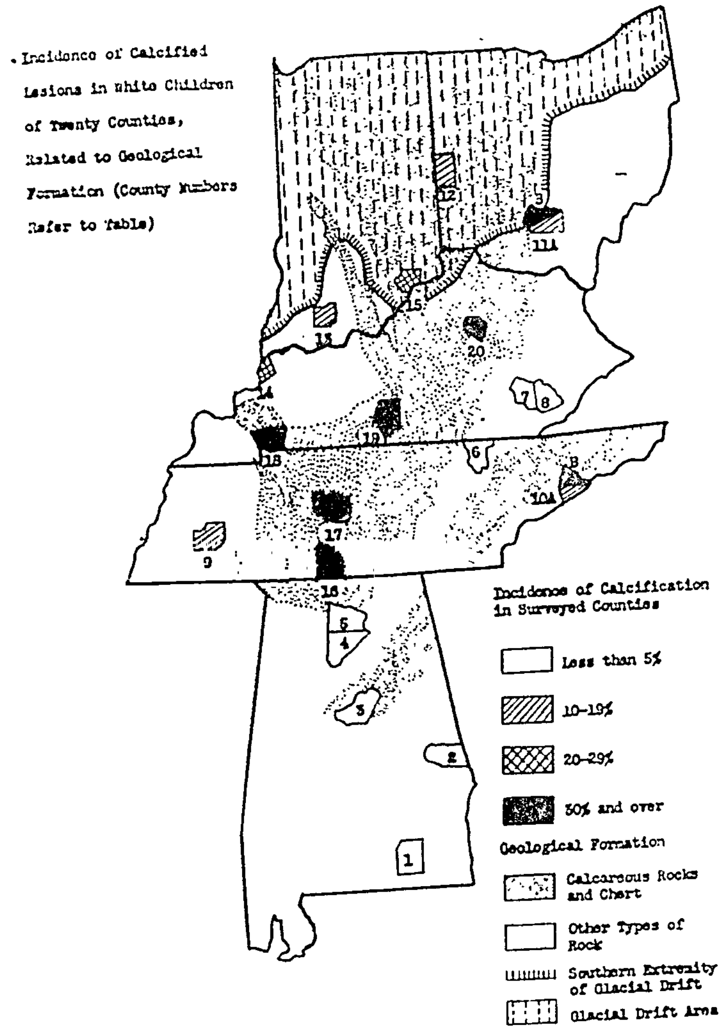
TABLE 3

Comparison of Incidence of Intrathoracic Lesions Demonstrated by X-ray Examination in Residents of Giles County, Tenn., and Coffee County, Ala., by Color

	White				Colored			
	Number		Per cent		Number		Per cent	
	Giles	Coffee	Giles	Coffee	Giles	Coffee	Giles	Coffee
Total Number Examined	4,377	3,667			1,269	933		
I. Presumptive Tuberculosis								
1. First Infection Type (Focal Parenchymal Infiltration or Enlarged Hilum Glands)	6	2	0.1	0.05	5	0	0.4	0.0
2. Reinfection Type								
a. Minimal	34	12	0.8	0.3	7	3	0.6	0.3
b. Moderately Advanced	17	5	0.4	0.1	4	1	0.3	0.1
c. Far Advanced	6	0	0.1	0.0	3	0	0.2	0.0
Total	57	17	1.3	0.5	14	4	1.1	0.4
II. Lesions of Doubtful Significance								
1. Focal Parenchymal Lesions, Not Calcified	4	4	0.1	0.1	2	2	0.2	0.2
2. Focal Parenchymal or Glandular Calcification	1,473	31	33.7	0.8	271	7	21.4	0.7
3. Miliary								
a. Infiltration	2	0	0.05	0.0	0	0	0.0	0.0
b. Calcification	10	0	0.2	0.0	1	0	0.1	0.0
4. Irregular Thickening of Apical Pleura	20	4	0.5	0.1	3	0	0.2	0.0
III. Nonspecific Lesions								
1. Parenchymal	42	27	1.0	0.7	21	2	1.7	0.2
2. Pleural	32	17	0.7	0.5	18	4	1.4	0.4
IV. Cardiac and Aortic Lesions	53	40	1.3	1.1	51	26	4.0	2.6

two 12 grade schools, were examined in each of these counties. Our findings in these counties and in Giles and Coffee Counties, along with those of other workers in Williamson County, Tenn.,[4] and Lee County, Ala.,[5] are shown in Table 4 and Map 2. The findings in Lee and Williamson Counties are somewhat high in comparison with our findings in their respective regions presumably because in those two counties repeat examinations in oblique positions were made on doubtful cases which would have been recorded negative from single film examination.

The areas of high incidence of this condition correlate closely with the areas in which limestone and chert formations underlie the top soil and outcrop in many places. They also correlate generally with the areas of highest tuberculosis mortality. They are quite sharply defined geographically. In Giles County, Tenn., the incidence was found to be over 20 times as high as that in Cullman County, Ala., only 50 miles to the south. The incidence in Fayette County, Ky., was found to be over 50 times as great as in Leslie County, Ky., 60 miles to the southeast. Two counties, Ross in Ohio and Cocke in Tennessee, each with areas of different geological formations, showed a remarkably higher incidence among children in the schools located in the areas of limestone and chert. The only counties entirely in the limestone and chert area with an incidence below 30 per cent are Darke, Ohio (14.2 per cent), and Jefferson, Ind. (24.1 per cent), both of which are covered with glacial drift. The only counties outside the limestone and chert area with an incidence over 5 per cent are Madison, Tenn. (12.7 per cent), Union, Ky. (25.8 per cent), and Dubois, Ind. (10.4 per cent). Madison and



MAP 2

EAST CENTRAL UNITED STATES

Union Counties are subject to mixed influences from the coastal plain and river deposits on which they lie, whereas Dubois County is adjacent to limestone on the east.

The correlation between the environment and pulmonary calcification is further emphasized by comparing the findings in natives and non-natives. Of 11 counties or schools with less than 20 per cent of natives showing calcification, all but one showed a *higher* incidence in non-natives whereas of 5 counties or schools with 30 per cent or more natives showing calcification, all but one showed *lower* incidence in non-natives.

The pathological significance of these calcifications is not known. We have called attention in a previous paper [3b] to the lack of correlation between this condition and tuberculin sensitivity. The correlations between this condition and geological formations and tuberculosis furnish an epidemiological lead, which will be thoroughly explored by extensive experimentation on laboratory animals and otherwise. Recent findings of other workers [6] indicating the protective influence of aluminum dust against silicosis suggest one line of experimentation.

Pathological and Bacteriological Studies—The Divisions of Pathology and of Infectious Diseases of the National Institute of Health, and the Department of Pathology of Vanderbilt University Medical School, are coöperating with the field study force in conducting special studies in pathology, chemistry, bacteriology, and mycology

for the purpose of determining: (1) the exact nature and pathogenesis of focal pulmonary calcification, (2) the causes of apparently tuberculous pulmonary infiltration, sometimes with cavitation, in persons with negative sputum, and (3) whether different strains of tubercle bacilli predominate in the high and the low tuberculosis rate regions.

Studies of Communicability in Families—Intensive epidemiological, clinical, and x-ray studies are being made for the purpose of determining the incidence of active tuberculosis among family contacts in homes with one or more current or recent, known, sputum positive cases. About 100 homes in the low rate region of South Alabama, and a like number in the high rate region of South-central Tennessee will be covered by these studies. The evidence so far obtained suggests that, under comparable conditions of exposure, active tuberculosis is much more frequent among familial contacts in the Tennessee region than it is in the Alabama region.

Meteorological Studies—Because of the known biological effects of radiation on both the tubercle bacillus and its host, measurements of visible daylight for the past 3 years and of ultra-violet radiation for the past 18 months have been carried out in the two counties by the Industrial Hygiene Division of the National Institute of Health, coöperating with the field force.

It was found that Coffee County has received 36 per cent more daylight during the three winter periods and an annual average of 20 per cent more than

TABLE 4

Incidence of X-ray Demonstrable Calcified Lesions among White Children of Twenty Counties in the Southeastern United States

Counties (grouped according to specified per cent of lesions in natives *)	Lifelong Residence in County *					Some Previous Residence Outside County		No. on Map
		Per cent Lesions						
		Age in Years						
	Number Examined	5-9	10–14	15–19	Total † 5–19	No.	Per cent Lesions	
Less than 5 Per cent								
Coffee, Alabama	2,343	0.4	0.5	0.2	0.4	*	...	1
Lee,‡ Alabama	948	3.1	5.6	2.8	4.1	*	...	2
Shelby, Alabama	289	1.1	1.5	0.0	1.0	218	1.8	3
Cullman, Alabama	344	2.2	2.3	0.8	1.8	151	3.3	4
Morgan, Alabama	410	3.6	3.5	7.0	4.6	109	10.1	5
Scott, Tennessee	398	2.7	2.4	2.5	2.5	86	4.7	6
Clay, Kentucky	219	2.7	2.7	5.6	3.5	90	13.3	7
Leslie, Kentucky	132	0.0	1.4	0.0	0.6	32	9.4	8
10 to 19 Per cent								
Madison, Tennessee	388	8.8	12.6	16.7	12.7	97	16.5	9
Cocke, Tennessee (Cosby School)	165	6.1	13.2	23.4	14.2	65	10.8	10A
Ross, Ohio (Harrison School)	154	11.9	21.9	15.4	17.3	42	26.2	11A
Darke, Ohio	364	6.1	14.4	21.6	14.2	148	24.3	12
Dubois, Indiana	401	9.3	8.1	14.7	10.4	132	22.0	13
20 to 29 Per cent								
Union, Kentucky	347	17.3	28.6	29.5	25.8	112	25.9	14
Jefferson, Indiana	509	12.9	27.1	30.0	24.1	10	40.0	15
30 Per cent and Over								
Giles, Tennessee	2,231	29.4	42.0	42.0	38.6	732	35.8	16
Williamson,‡ Tennessee	1,051	?	?	?	49.5†	*	....	17
Cocke, Tennessee (Parrotsville School)	281	20.0	30.8	45.7	32.3	14	35.7	10B
Trigg, Kentucky	352	19.3	35.1	41.4	32.6	148	31.1	18
Barren, Kentucky	466	27.6	30.4	36.8	31.5	None		19
Fayette, Kentucky	305	35.2	42.1	44.8	41.0	193	31.6	20
Ross, Ohio (Clarksburg School)	251	29.3	33.0	37.9	33.4	50	18.0	11B

* Except in Coffee, Lee, and Williamson Counties, where non-natives are not recorded separately

† Total per cent adjusted to age distribution of Giles County white school population examined (except Williamson County total)

‡ Survey by other agency

Giles County. For two of the 3 years, the winter difference averaged about 50 per cent and in some months averaged as high as 100 per cent. The ultraviolet radiation during the single winter of observation showed an even greater difference in favor of Coffee County than did the daylight.

Continuous hygrothermographic records of temperature and humidity are also being made in the two counties. During the year of observation, there have been 7 times more diurnal temperature swings of at least 30° F. in Giles County than in Coffee County. During the past year, the monthly average relative humidity was found not to differ greatly in the two counties, but the records are being studied further for comparison of maximum and minimum humidities, dew points, and total vapor content of the atmosphere. Anemometric studies in the two areas are contemplated.

Geological Studies—The U. S. Geological Survey coöperated in making a thorough survey of the two counties, on the basis of which detailed studies were made of rock formations, soil, and water. Coffee County is in what is ordinarily known as a "sandy region," while Giles County is in a "limestone region" with limestone outcropping in many places. Interbedded with the limestone and outcropping with it is a considerable proportion of "chert," a sub-crystalline, flinty rock composed of nearly pure silicon dioxide.

One hundred and four samples of soil and 408 samples of domestic water supplies were collected from the different representative areas of the two counties and analyzed by the Geological Survey. The soil of Giles County was found to contain much more calcium and phosphorus than Coffee County soil, and about 5 times as much free silica of small particle size (under 5 microns). The water samples from Giles County were found much harder, due mainly to calcium bicarbonate content, whereas those from Coffee County were found to be more acid.

Food Chemistry Studies — Concurrently with the geological studies of soil and water, a study of the foods of the two counties was undertaken through coöperation from the Division of Chemistry of the National Institute of Health. Quantitative analyses for silica, iron, manganese, magnesium, calcium, phosphorus, potassium, and sulphur have been made of 140 different samples of 7 staple, locally produced foods from the two counties, and other foods are now being analyzed. Vitamin C determinations on 100 samples of fresh vegetable foods from the two counties have been carried out.

The foods from Giles County were found in general to contain larger amounts of calcium and phosphorus, and those from Coffee County to contain more vitamin C and to have a higher magnesium/calcium ratio.

DISCUSSION

Nothing in these findings furnishes cause for discouragement to any of us concerned with practical measures for the prevention of tuberculosis. The ingenuity of public health administration can be expected to apply advantageously any additional knowledge which may be acquired by such research. The delineation of the high and the low tuberculosis rate regions provides a basis for strategic attack. Even in the highest rate regions, there has been for years and is continuing a gratifying decrease in tuberculosis mortality. Not all of the factors operating in the causation of this decrease are understood. Additional knowledge should augment the progress. If ingredients of dust, grime, water or foods, or meteorological conditions were proved to be damaging in one region or protective in another, advantageous adjustments should become feasible.

In the course of our research in the two areas, over 50 cases of previously unrecognized reinfection type tuberculosis have been found and brought under the supervision of local health departments. We now are developing a portable modification of the radiophotography (photography on a small film of the chest image on a fluoroscopic screen) technic which is reported satisfactory in screening surveys abroad[7] and to a small extent in this country. Promising results have been obtained with this method, which is expected to provide x-ray photographs of the chest at a cost of less than one cent each. This technic may help to lead us out of the present maze of tuberculin testing by serving as a most advantageous and economical "screen" in case finding for tuberculosis and other diseases, and thereby relegating tuberculin testing to its proper place as a procedure in differential diagnosis.

CONCLUSION

The findings to date from these continuing studies strongly suggest that some factor or set of factors of a general environmental nature such as may derive directly from the soil or the sunlight, operates importantly in the causation of the regional distribution of tuberculosis mortality in the southeastern section of the United States.

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Development of Tuberculosis in a Controlled Environment*

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OPINIONS on the subject of the pathogenesis of reinfection type tuberculosis are today divided into three schools of thought: (1) those who believe that reinfection type tuberculosis is the result of an "endogenous exacerbation" of residual lesions from primary infections; (2) those who believe it to be the direct result of an "exogenous reinfection"; and (3) those who believe that reinfection type tuberculosis may be due to either mechanism.

Briefly, the purpose of the present investigation is to study a group of people under a controlled environment relatively free from communicable tuberculosis for a period of several years in order to bring to light additional information concerning this subject.

In January, 1936, the Division of Tuberculosis of the New York State Department of Health, with the coöperation of the Department of Mental Hygiene, undertook a study of the inmates of the Newark State School for Mental Defectives, with the purpose of comparing the relative potency and specificity of Old Tuberculin and Purified Protein Derivatives in the practical application of the Mantoux test.

The details of this study were published in the *American Review of Tuberculosis*, for March, 1937. At the conclusion of this part of the investigation it was decided that further advantage should be taken of the unique opportunities offered by the Newark State School, and of the results already obtained, for the continuation and expansion of the study.

Of special significance was the fact that all the open cases of tuberculosis detected in the original study were concentrated in 13 of the 24 wards of the institution, while in the remaining 11 wards no cases, or only inactive cases, were found. This condition, and the fact that it later was possible to isolate the open cases, provided the opportunity for studying the subsequent development of tuberculosis among two groups of inmates—those exposed and those not exposed to a case of active tuberculosis.

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From a practical standpoint, the Newark institution seems to offer satisfactory conditions for carrying out such a study. The number of inmates, approximately 2,300 at present, is large enough to supply adequate research material. Relatively few inmates are discharged from one year to another; in fact, many of them remain in the institution, often in the same building, all their lives, and have no contact with the outside world except for occasional visitors. They live in sufficiently close contact with each other to permit one open case of tuberculosis to spread the infection to most of the inmates living in the same ward. Such contact as exists between inmates of different wards is comparatively casual and is due to work in the kitchen, laundry, or elsewhere, which is required of those able to work in an institution of this kind. Furthermore, the very large percentage of positive reactors detected at the beginning of the survey provides a sufficiently large initial number of individuals who have already undergone the primary infection and who are, therefore, subjects for reinfection.

It is well known that the general death rate and the specific death rates from respiratory diseases in institutions for mental defectives are higher than those in the general population. The total death rate in Newark State School for the 3 year period 1936–1938 was 22.4 per 1,000 population compared with a rate of 12.7 for the entire upstate population of New York State in 1937. It would seem that the inmate population of this institution is constitutionally inferior and particularly prone to respiratory diseases.

The buildings of the institution are separated into two main groups—one for females and the other for males. The female division, with a total of 1,190 beds, is made up of 13 wards, some of them located in a group of buildings connected with the administration building, and the others located in smaller buildings scattered throughout the grounds. Their bed capacity has not changed materially during the period of the survey.

The male division of 1,123 beds is made up at present of 11 wards in 4 large buildings. As a result of expansion in the physical plant and of the opening of 2 new buildings, the bed capacity of this division was increased by approximately 500 during the summer of 1937, a large number of male inmates being transferred to Newark from other state institutions. For the past 2 years, the average census of the institution has been close to capacity.

The period of observation covered by this report with regard to the development of reinfection type tuberculosis extends from February, 1936, to March, 1939. There was a lapse of 14 months from the beginning of the study until the present more intensive investigation was instituted in April, 1937, when all admissions and previously negative reactors were tuberculin tested, and all new and previously positive reactors were x-rayed. Since then the procedure has been to test all admissions and negative reactors every 6 months with 0.00025 mg. PPD, and immediately x-ray all those giving a positive reaction for the first time. In addition, all previously positive reactors are x-rayed once a year, the males in April and females in October.

There are no accurate data available concerning the date of onset or the mode of development of the cases diagnosed at the beginning of this study in February, 1936.

In June, 1936, as a check to determine whether any significant pathology had been missed among the negative reactors, 500 negative reactors were x-rayed. No significant tuberculous pulmonary pathology was found among them.

It was the purpose to isolate all cases as soon as detected. For the first 18 months of the study, however, because of lack of sufficient isolation quarters, this was not entirely possible. While this condition at first glance might appear undesirable, actually that period provided a striking demonstration of the effects of inadequate segregation. After October, 1937, isolation of recognized infectious cases became more nearly adequate, but during the intervals between examinations there invariably were present one or more unisolated cases which had developed and remained unrecognized until the next scheduled examination.

A careful check was made of the residence of the entire inmate population by buildings and wards, as well as the movements of inmates between buildings and wards, in order to determine the history and duration of exposure to reinfection type tuberculosis.

It has not always been possible to establish definitely the clinical status and the degree of communicability of the disease in the cases observed. Thorough and satisfactory examinations for the presence of tubercle bacilli in the sputum, laryngeal smear, and gastric contents could not always be carried out. Only the serial x-ray films could be depended upon to show evidence of cavitation and of other changes indicative of progressive, retrogressive, or stationary lesions. The diagnoses made are limited, therefore, to broad roentgenologic interpretations which classify the lesions as apparently active or apparently inactive. Postmortem examinations have confirmed the diagnoses in several cases.

On the basis of this classification of cases, the inmates are divided into two groups: (1) those who at some time since the beginning of this study have been in contact with active reinfection type pulmonary tuberculosis in the same ward; (2) those who have not been in contact with active reinfection type tuberculosis.

Although it is too early, in the present stage of the study, to make a comprehensive and conclusive report, an appraisal of the findings obtained thus far might be enlightening in pointing out the trend toward the final results.

At the beginning of the study, in February, 1936, 34 cases of apparently active reinfection type tuberculosis were found among the 1,741 inmates examined, 4 among the 626 males, and 30 among the 1,115 females. In addition, 4 cases were discovered among later admissions at the time of their first examination, 3 males and 1 female; these are not included in the 25 new cases, to be discussed later, whose development during residence was observed.

Of the 1,707 white * inmates who were tuberculin tested in February 1936 (Table 1), a total of 1,069, or 62.6 per cent, reacted positively to different doses of OT and PPD. In the group of 1,146 persons living in buildings or wards with an infectious case of tuberculosis, 72.1 per cent showed positive reactions, with very little difference between males and females. Among the 561 inmates living in wards with no infectious case, 43.3 per cent gave positive reactions, 40.1 per cent of the males, and 57.1 per cent of the females.

Approximately 90 per cent of the 514 inmates over 30 years of age in February, 1936, showed positive reactions, the percentage of positive reactors being almost the same among those exposed and those not exposed to an infectious case.

Among the 953 persons admitted after February, 1936, 30.4 per cent of the total and 60 per cent of those over 30 years of age gave positive reactions at the time of admission.

* A few colored inmates have been omitted from this table and from other tables in this paper. They will be included in the final report. However, no new cases developed in this group.

TABLE 1

Tuberculin Reactions at Beginning of Survey, by Sex and Exposure to Infectious Tuberculosis, February, 1936

	Total Tested		Exposed to Infectious Case *		Not Exposed to Infectious Case *	
	Number	Per cent	Number	Per cent	Number	Per cent
Both Sexes—Total	1,707	100.0	1,146	100.0	561	100.0
Tuberculin neg.	638	37.4	320	27.9	318	56.7
Tuberculin pos.	1,069	62.6	826	72.1	243	43.3
Male—Total	610	100.0	154	100.0	456	100.0
Tuberculin neg.	315	51.6	42	27.3	273	59.9
Tuberculin pos.	295	48.4	112	72.7	183	40.1
Female—Total	1,097	100.0	992	100.0	105	100.0
Tuberculin neg.	323	29.4	278	28.0	45	42.9
Tuberculin pos.	774	70.6	714	72.0	60	57.1

* Exposure at time of examination, regardless of past history

In the period of approximately 38 months between February, 1936, and March, 1939, 25 new cases of tuberculosis developed. Twenty of these appeared in persons who were inmates when the study was started in February, 1936; the remaining 5 were in later admissions who first came under observation as follows: 2 in April, 1937, 2 in October, 1937, and 1 in October, 1938.

The 20 who entered the experience in February, 1936, were at first equally divided into negative and positive tuberculin reactors. Of the 10 negative reactors, 7 had become positive at the end of 14 months and 3 of these had developed acute disease. In addition, 1 negative reactor had developed miliary tuberculosis, confirmed at autopsy. At the end of 20 months, only 1 of these 10 originally negative reactors still remained negative and 7 had developed active disease, 3 of whom had died. During the next 6 months the last negative reactor had become positive and all of the 10 had developed active disease, with the number of deaths still remaining at 3. After 32 months of observation, 5 were still alive and 5 were dead. Five were still alive at the end of 38 months.

The 10 inmates who developed tuberculosis after entering in February, 1936, as positive reactors, showed no x-ray evidence of pulmonary tuberculosis at the first examination. Fourteen months later 4 had developed active disease; in 20 months 7 had developed active disease, 1 of whom had died; in 26 months 9 had developed active disease with no increase in deaths; by the end of the survey period, in 38 months, all of the 10 had developed active tuberculosis, with a total of 3 deaths.

These 20 cases, equally divided originally among negative and positive reactors, are too small a number to yield results which are statistically significant. In this group, however, it would appear that when reinfection type tuberculosis shows itself shortly after the development of a primary infection in previously negative reactors, the disease is more rapidly progressive and fatal. Thus, there were 5 deaths at the end of 32 months among the 10 cases developed in original negative reactors as against 3 deaths at the end of 38 months among the 10 cases in original positive reactors.

Of the 5 cases which developed among persons admitted subsequent to February, 1936, 2 had been negative to tuberculin at first examination and 3 had been positive. One negative reactor was first observed in April, 1937. Six months later he was positive without x-ray evidence of disease, and 12 months later, he had advanced disease. The other negative reactor

was first observed in October, 1938, and in 5 months had developed a positive reaction and minimal disease. Of the 3 positive reactors, 1 was first observed in April, 1937, and 2 in October, 1937. Two of the 3 developed tuberculosis in 1 year and the third in 17 months. There were no deaths among these 5 cases.

All of the 25 new cases occurred among inmates who had been exposed during the time of the survey to active tuberculosis in the same ward. No cases developed among those who had not been so exposed.

In order that the rates of incidence of new cases and of changes from negative to positive tuberculin reaction might be computed on a comparable basis for groups in which the individuals have been observed for varying periods of time, the observations of inmates are expressed in terms of person-years of life experience, of which the unit is 1 person under observation for 1 year. This was done by application of the life table method used by Frost and others. The life experience of each inmate is calculated from the date of first examination to last examination. Inmates cease to be a part of the population upon which the rates of incidence of cases are computed at the date of the examination when diagnosis of active tuberculosis is made. They cease to be a part of the population upon which the rates of incidence of tuberculin positive reactions are computed at the date of examination when the change from negative to positive reaction is observed.

The person-years of observation of those not exposed to an infectious case include the entire observed experience of those at no time exposed, and the period preceding exposure for those who

TABLE 2

Incidence of Reinfection Type Tuberculosis, by Sex and Exposure to Infectious Case

	Person-Years Observed Tuberculin Neg. and Pos.			Cases					
				Total		Male		Female	
Period of Observation	*Total*	*Male*	*Female*	*Number*	*Rate* †	*Number*	*Rate* †	*Number*	*Rate* †
				Exposed to Infectious Case					
Total	3,382	1,111	2,271	25	7.4	9	8.1	16	7.0
Feb. 1936–Apr. 1937	1,185	214	971	10	8.4	3	14.0	7	7.2
Apr. 1937–Oct. 1937	552	147	405	6	*	1	10.1* (Apr. 1937–Apr. 1938)	5	12.3
Oct. 1937–Apr. 1938	633	248	385	5	*	3		2	3.9* (Oct. 1937–Oct. 1938)
Apr. 1938–Oct. 1938	661	270	391	1	*	..	4.0* (Apr. 1938–Mar. 1939)	1	
Oct. 1938–Mar. 1939	351	232	119	3	*	2		1	*
				Not Exposed to Infectious Case					
Total	1,441	1,048	393	0	...	0	...	0	...
Feb. 1936–Apr. 1937	562	457	105	..	...	..	...	..	...
Apr. 1937–Oct. 1937	238	167	71	..	...	..	...	..	...
Oct. 1937–Apr. 1938	233	159	74	..	...	..	...	..	...
Apr. 1938–Oct. 1938	237	146	91	..	...	..	...	..	...
Oct. 1938–Mar. 1939	171	119	52	..	...	..	...	..	...

* Total rates after April, 1937, are omitted, and rates for males and females are computed for different periods because males were routinely x-rayed in April and females in October, as explained in the text.

† Rate per 1,000 person-years.

TABLE 3

Incidence of Reinfection Type Tuberculosis, by Age, Sex and Exposure to Infectious Case

Age	Person Years Observed Tuberculin Neg. and Pos.			Cases			Rates per 1,000 Person-Years		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
	Exposed to Infectious Case								
All ages	3,382.0	1,110.9	2,271.1	25	9	16	7.4	8.1	7.0
Under 5 years	30.1	24.5	5.6	..	..	..	...	...	...
5– 9 years	200.2	65.8	134.4	..	..	..	...	...	...
10–14 years	367.0	109.2	257.8	1	1	..	2.7	9.2	...
15–19 years	729.8	303.6	426.2	8	3	5	11.0	9.9	11.7
20–29 years	877.2	323.4	553.8	10	4	6	11.4	12.4	10.8
30–39 years	546.1	134.2	411.9	3	..	3	5.5	...	7.3
40–49 years	438.0	84.1	353.9	3	1	2	6.8	11.9	5.7
50 years and over	193.6	66.1	127.5	..	..	..	...	...	...
	Not Exposed to Infectious Case								
All ages	1,441.5	1,048.4	393.1	0	0	0	...	...	...
Under 5 years	9.8	7.7	2.1	..	..	..	...	...	...
5– 9 years	280.4	217.3	63.1	..	..	..	...	...	...
10–14 years	523.5	415.3	108.2	..	..	..	...	...	...
15–19 years	334.5	252.0	82.5	..	..	..	...	...	...
20–29 years	173.9	104.6	69.3	..	..	..	...	...	...
30–39 years	71.7	33.2	38.5	..	..	..	...	...	...
40–49 years	40.3	12.2	28.1	..	..	..	...	...	...
50 years and over	7.4	6.1	1.3	..	..	..	...	...	...

became exposed after the beginning of the survey. The person-years of observation of those exposed to an infectious case include the life experience for the entire period following exposure of at least 1 month during the survey.

The 25 new cases which developed in the 38 months represent a rate of 7.4 per 1,000 person-years among inmates exposed to an infectious case of tuberculosis (Table 2). The rate for males in this group was 8.1 per 1,000 person-years, and 7.0 for females. During the first 14 months of observation, the rates were 14.0 and 7.2, respectively, for males and females, but for the last 12 months of observation these rates had decreased to 4.0 and 3.9 respectively. The availability of more adequate facilities for isolation obviously was responsible for these decreases.

The highest incidence of cases was observed in the age groups 15–19 and 20–29, with rates of 11.0 and 11.4 per 1,000 person-years respectively (Table 3). These age groups include nearly half of the total person-years of observation in the exposed group.

The inmates not exposed to infectious cases were a smaller group and slightly younger. The largest group among both males and females was 10–14 years of age, with the group 15–19 next in size. If the rates for specific ages of the exposed group were applied to the unexposed group, the total number of expected cases would be 10, 8 among males and 2 among females, and the incidence rate for the group would be 6.9 per 1,000 person-years. Actually, in this group no new case developed.

It was to be expected that the rate of change from negative to positive tuberculin reactions would be higher for the exposed group than for the non-exposed. Actually, this rate was almost 6 times as high for the exposed group, 15.5 per 100 person-years of observation, compared to 2.7 per 100 person-years for the non-exposed group (Table 4). The effect of inadequate isolation during part of the time is well illustrated. Not until the period April–October, 1938, when isolation was more satisfactory, is there a definite decrease in the

TABLE 4

Incidence of Change from Negative to Positive Tuberculin Reaction, by Sex and Exposure to Infectious Tuberculosis

Period of Observation	Person-Years Observed, Tuberculin Negative: Total	Male	Female	Changes from Negative to Positive Reaction: Total	Male	Female	Rate of Change per 100 Person-Years: Total	Male	Female
	Exposed to Infectious Case								
Total	1,121	398	723	174	113	61	15.5	28.4	8.4
Feb. 1936–Apr. 1937	351	62	289	50	12	38	14.2	19.4	13.1
Apr. 1937–Oct. 1937	161	49	112	23	10	13	14.3	20.4	11.6
Oct. 1937–Apr. 1938	231	119	112	72	68	4	31.2	57.1	3.6
Apr. 1938–Oct. 1938	207	93	114	17	16	1	8.2	17.2	0.9
Oct. 1938–Mar. 1939	171	75	96	12	7	5	7.0	9.3	5.2
	Not Exposed to Infectious Case								
Total	931	703	228	25	15	10	2.7	2.1	4.4
Feb. 1936–Apr. 1937	324	277	47	7	5	2	2.2	1.8	4.3
Apr. 1937–Oct. 1937	151	116	35	11	6	5	7.3	5.2	14.3
Oct. 1937–Apr. 1938	148	104	44	..	..	..	...	...	...
Apr. 1938–Oct. 1938	165	113	53	3	1	2	1.8	0.9	3.8
Oct. 1938–Mar. 1939	143	94	49	4	3	1	2.8	3.2	2.0

rate of change from negative to positive in the exposed group.

For the total period, the rate for exposed males was considerably higher than that for exposed females, 28.4 compared with 8.4. It is possible that this excess among males was due to the continued presence of unisolated cases in more advanced stages than the cases among females. During the period from October, 1937, to April, 1938, there was a marked increase in the rate among males. This was undoubtedly the result of conditions which prevailed during the summer and fall of 1937 when several male cases of active tuberculosis, some moderately advanced, remained unisolated, incident to the opening of the new hospital for boys, and the sudden influx of new admissions and reallocation of old inmates.

TABLE 5

Incidence of Change from Negative to Positive Tuberculin Reaction, by Age, Sex and Exposure to Infectious Case

Age	Person-Years Observed, Tuberculin Negative: Total	Male	Female	Changes from Negative to Positive Reaction: Total	Male	Female	Rate of Change per 100 Person-Years: Total	Male	Female
	Exposed to Infectious Case								
All ages	1,120.7	397.8	722.9	174	113	61	15.5	28.4	8.4
Under 5 years	23.6	20.7	2.9	4	4	..	16.9	19.3	...
5– 9 years	166.1	61.9	104.2	8	5	3	4.8	8.1	2.9
10–14 years	257.9	64.9	193.0	21	16	5	8.1	24.7	2.6
15–19 years	365.6	126.6	239.0	57	34	23	15.6	26.9	9.6
20–29 years	192.7	82.5	110.2	49	32	17	25.4	38.8	15.4
30–39 years	64.2	20.7	43.5	18	12	6	28.0	58.0	13.8
40–49 years	36.0	11.3	24.7	11	6	5	30.6	53.1	20.2
50 years and over	14.6	9.2	5.4	6	4	2	41.1	43.5	37.0
	Not Exposed to Infectious Case								
All ages	930.6	702.7	227.9	25	15	10	2.7	2.1	4.4
Under 5 years	8.9	7.5	1.4	..	..	..	...	...	...
5– 9 years	246.4	191.4	55.0	4	3	1	1.6	1.6	1.8
10–14 years	392.3	313.4	78.9	8	5	3	2.0	1.6	3.8
15–19 years	209.0	151.6	57.4	10	6	4	4.8	4.0	7.0
20–29 years	58.9	33.9	25.0	3	1	2	5.1	2.9	8.0
30–39 years	12.1	3.7	8.4	..	..	..	...	...	...
40–49 years	3.0	1.2	1.8	..	..	..	...	...	...
50 years and over	...	...	...	..	..	..	...	...	...

The rate of change from negative to positive reactions, by age, sex, and history of exposure, shows that in all age groups the rate was higher among males than among females in the exposed group (Table 5).

This study has not continued long enough to warrant definite statements or conclusions about the relative importance of endogenous versus exogenous reinfection. Thus far, under conditions outlined above, every case of reinfection type tuberculosis which has developed could be associated with the presence of an infectious case in its immediate environment. On the other hand, among inmates who at no time were associated intimately with an open case of tuberculosis, not one case of reinfection type tuberculosis has developed.

Nursing Agencies

JULIA GROSCOP'S Committee to Study Relationship between Official and Nonofficial Public Health Nursing agencies makes a preliminary report in the 1939–1940 *Year Book* on the results of a questionnaire submitted to 322 agencies employing public health nurses in an effort to learn to what degree and how coördination of community nursing services in urban and rural areas is being brought about. Seventy per cent of the agencies have turned in completed questionnaires, representing 37 states and the District of Columbia. The committee has made a good beginning in analyzing them, and the study when completed should show the strengths and weaknesses in community organization and planning for public health nursing services and indicate profitable directions for future endeavor.—The A.P.H.A. *Year Book* is a supplement to February, 1940, issue of the *American Journal of Public Health.*

The Food Value and Economics of Skim Milk*

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"ALMOST 50 billion lbs. of skim milk are fed to animals or destroyed every year."

"Skim milk is a by-product of sweet cream and butter."

"Only about 12 per cent of all the skim milk produced in the United States during the 5 year period 1930–1934 was used in the manufacture of dairy products."

"Skim milk is not sold on the market on account of the popular prejudice against it."

The authority for these statements is the U. S. Department of Agriculture.[1, 2, 3] No one knows, and apparently no government agency has ever attempted to find out, how much of this 50 billion lbs. of skim milk is fed to animals and how much is destroyed or in what way it is destroyed.

Such a use or misuse of this quantity of skim milk, which contains billions of pounds of the finest quality of human food nutrients known to man, constitutes a colossal social and economic waste. Who bears the tremendous cost of producing this product? What would its utilization as human food mean to producers and consumers? These and other questions should receive a most serious study by social and economic workers interested in the health and well-being of the American people, particularly in these times, when millions of our population are on relief, and malnutrition is almost a national calamity.

The milk of all mammals in a state of nature contains all of the food nutrients, factors, or essentials necessary to promote life, health, and growth of their young during the infantile period of their existence. These food essentials are proteins, carbohydrates, fats, minerals, fat soluble vitamins, water soluble vitamins, other minor constituents, and water. Skim milk contains all of these essentials of whole milk except the milk fat and the fat soluble vitamins. Skim milk contains some milk fat and fat soluble vitamins but not as much as whole milk.

Notwithstanding this fact there is a strong unwarranted prejudice on the part of the public generally against the use of skim milk for food. It is not sold on the market. The government, therefore, does not publish any price quotations on it. The reports in July, 1938, of 61 Cooperative Milk Producers' Associations in 27 states, claiming to represent millions of dairy farmers, showed that the dairy farmers were receiving generally from about $2.25 to $3.25 per 100 lbs. for that portion of their milk that was going to the housewives and others for

* Read before the Food and Nutrition Section of the American Public Health Association at the Sixty-eighth Annual Meeting in Pittsburgh, Pa., October 19, 1939.

fluid milk consumption. The remaining portion of their milk was used for manufacturing purposes—ice cream, condensed or evaporated milk, cheese, and butter. The portion used for butter making, so-called "Surplus Milk," was bringing the dairy farmers only from \$.77 to \$1.18 per 100 lbs. This shows that butter is not a market outlet for milk. It is a market outlet only for the milk fat in milk. The milk diverted for butter-making is given a market value of less than one-half of the market value placed on milk for fluid milk consumption.

In view of these facts and commercial practices there is little excuse for trying to legislate skim milk or skim milk compounds out of business, thereby forcing more of it into wasteful channels. Industry and legislative effort to find or create a market for this wholesome foodstuff would be in the interest of dairy farmers and consumers.

The League of Nations[4] makes the following statement in regard to skim milk:

> It is highly desirable that the consumption of whole milk should increase, and every effort should, of course, be made to accomplish that end. But it is unfortunate that the prejudice against skimmed milk has, in certain cases, resulted in a reduction of total milk consumption. The special nutritive value of milk lies in its mineral and protein content, and this is in no way reduced through the removal of the butter fat. On the contrary, pint for pint, skimmed milk contains more calcium, more phosphorus, more sulphur, more iron, and more protein (though, of course, fewer calories) than full milk. Skimmed milk is much cheaper than whole milk, as the presence of the butter fat raises the price, and could fall well within the reach of many who do not now buy full milk in adequate quantities.

Your speaker has not been able to find a comparable statement by anybody in this or in any other country except the one made by the Minister of Agriculture of Canada.[5] It is not popular to make such recommendations in this country. It is quite popular to talk about the miracles of science in converting milk products into paint bases, plastics, spinnable fibers, and spinnable yarns.

Skim milk is of course a good foodstuff for animals. This is due principally to the superiority of milk proteins to the proteins of the cereal grains like corn, wheat, and oats. According to Linfield,[6] skim milk has been found to be worth just about half as much as whole milk for feeding pigs. Pigs can store up in their bodies as body tissue 66 per cent of the milk proteins of the skim milk they consume. When fed only corn, wheat, or oat grains, they can store up in their bodies only 23 per cent to 27 per cent of the total proteins in their feed. When fed 1.3 lbs. of skim milk to each lb. of corn, pigs make 62 per cent of the total proteins in their feed into body tissue,[7] but the edible portion of the pig's body tissue does not by any means contain all of the protein in the pig's body tissue.

It requires 10 lbs. of the food nutrients in skim milk to produce 1 lb. of food nutrients in the form of pork.[8] Hence, 90 per cent of the food nutrients or food value of skim milk is wasted when it is fed to pigs for conversion into pork. And the food nutrients in skim milk, pound for pound, are equal if not superior in food value to the food nutrients in pork! Hence, feeding the fine human food nutrients in skim milk to pigs to make pork is a wasteful practice and unsound economics; but of course it is not so bad as pouring skim milk on the ground or running it into the sewers from the cream separators on the farms and in our creameries.

Some idea of the seriousness of the waste of human food nutrients incident to the destruction of 50 billion lbs. of skim milk every year is given by the following facts:

> It contains about 75 million lbs. of milk

fat which is sufficient to make about 93 million lbs. of butter.

It contains about 1½ billion lbs. of milk proteins which are equal in food value to the edible beef proteins in 20 million beef steers.

It contains about 300 million lbs. of mineral food essentials, equal to the edible mineral content of about 15 million beef steers.

It contains about 2 billion lbs. of milk sugar, equal in food value to as many pounds of cane sugar.

It contains a specific for the prevention and cure of pellagra.

It contains all of the water soluble vitamins of 50 billion lbs. of whole milk.

And yet these enormous quantities of these human food essentials are poured out on the ground, or into the sewers, or fed to animals every year.

From the foregoing facts about the food value and superior quality of the food nutrients in skim milk and about the economic waste contingent with the separation of milk into skim milk, cream, and milk fat, it is obvious that the ideal dietetics and economics of the milk situation would be the human consumption of the product of the cow as whole milk, condensed or evaporated whole milk, and, to some extent, whole milk cheese. That would not entail any great loss of its food nutrients. If milk cannot be sold according to such ideal dietetics and economics, there certainly should not be any prejudice against the sale of any of the parts into which it is divided. There certainly ought not to be any restrictions, discriminations or prohibitions against compounding skim milk with other foodstuffs for use as human food in the manufacture of food products that supply a want of the people and that can be produced economically to advantage.

Every wholesome foodstuff should be a permanent factor in the national dietary. Each has its place. The senseless propaganda of one food against another should cease. This is especially so in consideration of the statement made by Thomas Carlyle many years ago to the effect that nine-tenths of mankind in the highest stage of civilization have to struggle in the lowest battle of the savage or even animal man in the battle against Famine.

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Application of the Phosphatase Test to Butter*

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ACCURATE control of the temperature and the time of heating in the pasteurization for dairy products is essential to good public health practice. Formerly the only proof of an adequate treatment was the chart of the recording thermometer. This, in turn, depended not only upon the integrity of the operator, but also upon the accuracy of the instrument. Therefore, the development of a dependable laboratory test to indicate the thoroughness of pasteurization has been widely sought and, to date, the phosphatase test appears to have the most promise as an effective laboratory method for the control of proper pasteurization.

In the original paper on the phosphatase test by Kay and Graham [1] a method was given for the application of the test to butter to determine if the butter had been made from adequately pasteurized cream. Scharer [2] advocated the use of his modifications for butter. Last year Shadwick and Parker [3] presented a paper showing the relation between the temperature of pasteurization of cream and the resulting phosphatase value of butter, although caution was recommended in interpreting a positive phosphatase test on unknown samples as indicative of the inadequate pasteurization of the cream used in its manufacture. Brown and Parfitt [4] applied the phosphatase test to a large number of commercial samples of butter and found that the test was of value in determining the adequacy of pasteurization of the cream used in its manufacture. However, they found that the butter tended to give a more positive reaction than the cream from which it was made.

In studying the application of the phosphatase test to butter, the methods used were those developed by Scharer [5] and summarized under Method No. III of the Appendix of the Seventh Edition of *Standard Methods for the Examination of Dairy Products.*[6] Modifications were made as to time and temperature and the quantity of serum used was the same as stipulated for milk. The change was made only in the short technic.

Other tests that have been used for the determination of the phosphatase value of milk have been found to have commercial and laboratory limitations when applied to butter.

The purpose of this paper is to show:

* Read at a Joint Session of the Laboratory and Food and Nutrition Sections of the American Public Health Association at the Sixty-eighth Annual Meeting in Pittsburgh, Pa., October 20, 1939.

1. The relation of the phosphatase value to other microbiological tests.
2. The agreement secured by two laboratories when analyzing identical samples of butter.
3. The study of the pasteurization of cream and the results of the phosphatase test on butter.
4. The influence of holding periods at various temperatures upon the phosphatase value of the butter.

RELATION OF PHOSPHATASE VALUE TO OTHER MICROBIOLOGICAL TESTS

The yeast and mold count of butter has been used by the industry as an index of pasteurization efficiency of cream and the degree of recontamination after pasteurization in the butter making process. In Table 1 are presented data which show that no relation exists between the yeast and mold count of 383 commercial samples of butter and the phosphatase reaction on the fresh butter. The distribution of yeasts and molds in butter reacting positively or negatively to the phosphatase tests was within experimental limits of error of both tests.

TABLE 1

Relation of Yeast and Mold Count of Butter to Its Phosphatase Reaction (105° F. for 30 Minutes)

Range of Count per cc.	Phosphatase Reaction: Negative	Positive
Below 11	14.5	6.7
11– 50	25.9	35.6
51– 100	14.0	20.0
101– 500	29.0	30.0
501– 1,000	6.7	4.4
1,001– 5,000	4.7	0.0
5,001–25,000	0.5	2.2
Over 25,000	4.7	1.1
Total number of samples	193	190

To determine the relation that may exist between the bacterial population of butter and phosphatase reaction, 361 samples of freshly churned butter obtained from about 40 different plants were studied. The results obtained are presented in Table 2 which indicate no relation between the total bacterial count as obtained in tryptone glucose skim milk extract agar, incubation at 32° C. and the phosphatase reaction.

In addition, the data suggest that populations of bacteria found in typical commercial butter as judged by the standard plate count and yeasts and mold counts did not affect the phosphatase reaction. However, the phosphatase test is being used in the industry to determine whether high yeast and mold and high bacterial counts obtained on fresh butter reacting negatively to the phosphatase test are due to recontamination during the manufacturing process.

TABLE 2

Relation of the Bacterial Count of Butter to Its Phosphatase Reaction (105° F. for 30 min.)

Range of Count per cc.	Phosphatase Reaction: Negative	Positive
Below 5,000	6.2	8.0
5,000– 10,000	10.2	13.9
10,000– 50,000	39.2	37.2
50,000– 100,000	14.7	15.3
100,000– 500,000	15.6	15.3
500,000–1,000,000	4.9	1.5
Over 1,000,000	9.0	8.7
Total numberof samples	224	137

(T.G.S.E. Agar — 32° C.)

The keeping quality of butter is dependent upon the efficiency of pasteurization, recontamination after pasteurization, and chemical changes initiated by organic and inorganic catalyzers. So far as microbiological changes in butter are concerned, it would be expected that butter made from cream in which the enzyme phosphatase was not inactivated would not have the same keeping quality as butter made from cream in which the phosphatase enzyme was inactivated. Table 3 shows the keeping quality on 950 samples of commercial butter and the phosphatase reaction of the butter when fresh. From these data, it is evident that the absence or presence of the enzyme phosphatase in butter is not an index as to its keeping quality. In addition, it is indicated by the results presented that those factors which

cause a drop in score of butter when the butter is held for 10 days at 60° F. are not indicated by the phosphatase reaction.

TABLE 3

Relation of the Keeping Quality of Butter to the Phosphatase Reaction (105° F. for 30 min.)

Drop in Score 10 Days at 60° F.	Phosphatase Reaction Negative	Positive
0.0	19.3	18.5
0.5	26.2	23.0
1.0	20.5	23.3
1.5	11.9	11.9
2.0	9.6	7.8
2.5	4.4	5.0
3.0	8.8	4.8
3.5	3.8	2.8
4.0	2.5	3.0
Total number of samples	588	362

AGREEMENTS SECURED BETWEEN LABORATORIES

In order to test out the agreement that may be secured between laboratories on identical samples of butter, the following experiment was undertaken. Samples from 10 consecutive churnings of butter were obtained from 7 creameries. The creameries from which these samples were obtained were located in Oklahoma, North Dakota, Missouri, Kansas, Illinois, and Indiana. The samples were sent to a central laboratory under adequate refrigeration where each sample was divided into two parts. One part was sent to the coöperating laboratory, the remaining half analyzed in the central laboratory. The creameries were selected upon their previous history, all were using the same type of pasteurization, and both No. 1 and No. 2 butter were used. The technicians in the two laboratories had discussed the modifications of the technic to be used following the procedures given by Scharer[5] and agreeing on the necessity for observing specific details, especially those pertaining to the purity of reagents because technic was conceded to be of paramount significance in the proper conduct of the test as determined by preliminary trials. The results secured on the agreement as to the phosphatase reaction of the butter are given in Table 4.

TABLE 4

Agreement Between Two Laboratories as to the Phosphatase Value on Identical Samples of Fresh Butter

Phosphatase Tests	Agreement	Disagreement
15 min. at 105° F.	59	11
30 min. at 105° F.	62	8
1 hr.* at 100° F.	49	21

(Number of samples — 70)

* Quantitative

Of the three methods used on the 70 samples, the two laboratories were in agreement on 59 samples when incubated for 15 minutes at 105° F.; 62 when using 30 minutes incubation and 49 when using the hour technic. The hour technic yielded the greatest number of samples in the disagreement as to having a positive or negative value due, in part, to the sensitivity of the test and to the fact that a sample was considered negative only when the phenol value was less than 0.4 p.p.m.

TABLE 5

Agreement Between Technics for Measuring the Phosphatase Value of Fresh Butter

Technics Compared	Agreement	Disagreement
15 min. vs. 30 min. at 105° F.	136	4
15 min. vs. 1 hr.	125	15
30 min. vs. 1 hr.	125	15

(Results of two laboratories — 70 samples)

The data presented in Table 5 on the same 70 samples show the agreement between the three methods in the hands of each of the two technicians. The results are presented on the total of 140 determinations made by the two technicians. Of the 140 determinations, agreement as to the phosphatase reaction of butter was obtained on 136 samples using the 15 minute incubation versus the 30 minute incubation. Of the four samples in which disagreement be-

tween tests was secured, both technicians obtained disagreement on one sample. Comparing both the 15 minute incubation and 30 minute incubation versus the 1 hour method, agreement was secured in 125 of the 140 determinations. In correlating this agreement a negative reaction, by the 1 hour method, was one in which the parts per million of phenol were below 0.4.

One of the points in controversy in the technic of making phosphatase tests on butter is in the collection of the butter serum. Some of the laboratories collect the serum by sedimentation at 40–43° C., while others collect the serum by centrifuging. Comparisons made as to the phosphatase reactions on serum collected by sedimentation and centrifuging indicate that in most samples no difference was obtained, however, in some samples and especially those that do not separate readily it appears that for the purpose of standardization, the test should be made on serum obtained by centrifuging.

PASTEURIZATION STUDIES

The objective of the phosphatase test as applied to butter is to determine the adequacy of the heat treatment of the cream from which the butter is to be made. In commercial practice, cream for butter making is pasteurized by one of two methods, viz., vat or flash. Vat pasteurization is that method of heating in a vat to a temperature, usually 145–160° F., holding for 30 minutes, and then cooling. Flash pasteurization is the heating of cream rapidly to a temperature of 180° F. or higher, holding momentarily, and then cooling.

Irrespective of the method of pasteurizing (flash or holding method) it has been found that positive phosphatase tests were obtained, and with more frequency in the cases of flash pasteurization than with the holding method. However, when the pasteurizing procedure is properly controlled, and irrespective of whether the flash or holding method is used, negative phosphatase tests have been obtained.

It is evident from data presented in Table 6 that phosphatase values of below 0.4 p.p.m. can be secured when using flash systems of pasteurization, for in this table are presented the phosphatase values on 10 consecutive churnings of the fresh butter from 7 plants and the temperatures used in pasteurization as indicated by the recording thermometers. Plants A and D manufactured butter with phosphatase values below 0.4 p.p.m. of phenol, while Plant B manufactured butter with phosphatase values all 0.4 or above. From these data it appears that phosphatase values of less than 0.4 p.p.m. can be secured by flash pasteurization and no direct relation exists between the temperature of cream as indicated by the recording thermometer and the phosphatase value of the resulting butter.

Table 7 shows a phosphatase test flow sheet on a creamery using flash pasteurization and manufacturing approximately 8,000 lbs. of butter during

TABLE 6

Comparison of Phosphatase Values of Individual Plants Using Flash Pasteurization

Plant	No. of Samples	Temp. of Past. ° F.	Phosphatase Value One Hour Test: Below 0.4	Phosphatase Value One Hour Test: 0.4 or Above
A	10	200–230	10	0
B	10	210–220	0	10
C	10	220	5	5
D	10	220	10	0
E	10	190–195	5	5
F	10	192–196	8	2
G	10	180–185	6	4

TABLE 7

Phosphatase Values Obtained on Cream and the Resulting Butter

Cream Temp.	*210° F.*		*220° F.*		*215° F.*		*215° F.*	
First Cream	—		—		—		—	
1 min.	—		—		—		—	
5 min.	—		—		—		—	
10 min.	—		—		—		—	
20 min.	—		—		—		—	
Mixture	—		—		—		—	
Churning	*A*	*B*	*A*	*B*	*A*	*B*	*A*	*B*
Butter								
Unwashed	—	—	+	+	—	—	—	—
Finished	—	—	±	—	—	—	—	—
Unwashed p.p.m.	—0.4	—0.4	2.0	2.0	—0.4	—0.4	—0.4	—0.4
Finished p.p.m.	—0.4	—0.4	0.4	0.4	—0.4	—0.4	—0.4	—0.4

(105° F. for 30 min.)

the day that this survey was made. This table is typical of other creameries studied. The cream before pasteurization was by-passed until the indicating thermometer reached the desired pasteurization temperature. The cream temperatures are those as given by the recording thermometer. Samples of cream were taken from the cooler before the cream entered the vat to be held for tempering before churning. Each vat held sufficient cream for two churnings. On the cream the phosphatase value was determined using 30 minutes' incubation at 105° F., and all samples were found negative. In the third and fourth churning from the second vat of cream, positive phosphatase values were obtained on the unwashed butter granules even though the cream was negative in phosphatase reaction, while on the finished butter, results obtained question the adequacy of pasteurization as judged by the application of phosphatase values used to measure the adequacy of pasteurization of milk. These data also suggest a concentration of the phosphatase enzyme in the butter and a need for further study on this point.

INFLUENCE OF HOLDING BUTTER IN TRADE CHANNELS

Butter differs from other dairy products in many ways and especially in the manner that it is handled in trade channels. Butter is held in cold storage for varying time periods and when it reaches retail channels of trade it is allowed to temper and is again refrigerated. The fact that butter is handled without many of the precautions given milk and cream raises the question as to what is the effect of these methods of marketing on the phosphatase value of the butter.

To determine possible injury to quality of butter while in trade channels, the industry holds samples of butter under constant temperatures for 8 or 10 days and notes the decrease in score. Laboratories using this keeping quality test and making phosphatase tests on the butter before and after incubation have frequently noted that samples which were negative when entering, became positive after incubation. In Table 8 is shown the number of samples which were negative when entering the keeping quality test and positive after the holding period. It is of particular interest to note that 8 days at 70° F. yielded a greater number of samples changing from negative to positive than did 10 days at 60° F. Of those samples, which according to the hour method contained more than 0.4 p.p.m. of phenol when fresh, 36 and 37 of them increased in phenol value during the keeping quality test. It would appear from these data that there exists a possibility of reactivation of the phos-

TABLE 8

Change in Phosphatase Value of Butter after Being Submitted to a Keeping Quality Test

Method Used to Determine Phosphatase Value	*Keeping Quality*	*No. of Samples Negative When Fresh, Positive After Storage*
15 min. at 105° F.	8 days at 70° F.	9
	10 " " 60° F.	6
30 min. at 105° F.	8 " " 70° F.	12
	10 " " 60° F.	5
1 hr.	8 " " 70° F.	12
	10 " " 60° F.	8
1 hr. (0.4 + p.p.m.)	8 " " 70° F.	36
	10 " " 60° F.	37

(Number of samples — 140)

phatase enzyme in butter when held at temperatures used to measure the keeping quality, or that during the holding period other factors which may affect the phosphatase reaction yield to higher or lower phenol values. Control values indicated that the higher phosphatase value was not due to impurity of chemicals nor to phenolic compounds in the butter.

fresh butter and for the same butter after it had been on retail routes for 5 and 7 days. This butter was handled as butter is frequently handled commercially, that is, kept under adequate refrigeration during the night and under limited refrigeration while on the retail wagon making deliveries to stores. These data show that the phosphatase test can only be applied to fresh butter in judging the adequacy of pasteurization until further knowledge is obtained as to the reasons for increase in phosphatase value when butter is held under conditions that prevail commercially.

TABLE 9

Effect of Commercial Methods of Handling Butter Upon Its Phosphatase Value

Plant		*Fresh Butter*		*Returned from Routes **	
		30 Min.	*1 Hr.*	*30 Min.*	*1 Hr.*
A	1	—	—0.4	+	6.0
	2	?	—0.4	+	5.0
	3	?	—0.4	+	6.0
	4	?	—0.4	+	4.0
	5	+	—0.4	+	3.0
	6	—	—0.4	+	6.0
	7	—	—0.4	+	3.0
	8	—	—0.4	+	3.0
	9	—	—0.4	?	0.7
	10	—	—0.4	+	4.0
B	1	—	—0.4	—	—0.4
	2	—	—0.4	—	—0.4
	3	—	—0.4	+	0.7
	4	+	—0.4	+	5.0
	5	?	—0.4	+	0.7
	6	—	—0.4	—	—0.4
	7	—	—0.4	—	—0.4
	8	—	—0.4	—	—0.4
	9	—	—0.4	—	—0.4
	10	—	—0.4	—	—0.4

* A — 5 days
B — 7 days

In Table 9 the data also suggest a reactivation of the phosphatase enzyme in that the butter obtained from Plants A and B had good keeping quality. The phosphatase values are given for the

SUMMARY

1. No relation was found to exist between the phosphatase value of the butter and its yeast and mold count, total bacterial count, and its keeping quality as measured by drop in score.

2. The agreement secured between the two laboratories on identical samples of butter was closer with the short methods than with the 1 hour method.

3. A higher percentage of phosphatase positive reactions was found coming from plants using flash systems of pasteurization than from plants using vat systems of pasteurization. However, some plants which were flash pasteurizing consistently yielded negative phosphatase reactions, indicating that the process was not at fault. Due to the possibility that the enzyme is concentrated in butter, and because of the lack of knowledge concerning its partition in butter from cream, further studies on this point are indicated.

4. It has been found that under the conditions which butter is marketed a significant number of samples will react negatively when fresh, and positively after receiving treatment comparable to commercial methods of distribution.

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Housing

THE arguments for and against the creation of a housing code are set forth lucidly and fairly in the Report of the Sub-Committee on Codes of the Committee on the Hygiene of Housing published in the 1939–1940 *Year Book.* The discussion begins with a thumbnail historical sketch of housing legislation and leads to a statement of the present-day situation when there are in effect a limited number of housing codes, passed chiefly as state legislation and large numbers of municipal building codes and zoning ordinances. The sub-committee admits that it is an open question as to whether encouragement should be given to the development of housing codes and indicates that further discussion is desirable and necessary.—The A.P.H.A. *Year Book* is a supplement to February, 1940, issue of the *American Journal of Public Health.*

Microbiological Content of Paper-board Used in the Packaging of Foods*

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IN a report presented last year [1] it was shown that rinse counts obtained from single-service milk containers of seven different types were remarkably low. In fact, these counts were found to be so low that it was necessary to use special precautions to avoid significant errors in making agar plate counts.

During the present year, it has been our privilege to study a series of 37 mills manufacturing paper-board out of which many types of food containers are made. This series of mills included nearly all of those making board for single-service milk containers, bottle caps, and closures. Improvements have been devised in the methods used for the disintegration of paper and paper-board. Various nutrient agars and incubation procedures have been studied. At the same time, routine analyses have been made of the paper-board manufactured by these mills. The microörganisms found have been isolated and identified.

These investigations of the sanitary quality of paper and paper-board products used in the packaging of foods include more than 4,600 bacteriological analyses of disintegrated stock representing several hundred shipments of container board, paper wrappers, and bottle cap stock. Twenty-five different types of paper products for food and household uses have been tested, including containers for milk and milk products, ice cream, butter, cheese; containers for dried foods; milk bottle cap and closure stock; paper cup, tray and plate stock; paper straws; waxed delicatessen and lunch papers; wrappers and tubes for sanitary paper products. This report emphasizes the results and significance of microbiological analyses of paper and paper-board intended for food packaging.

METHOD OF ANALYSES USED

In the first part of this work, the paper and paper-board were disintegrated by the use of the food mixer previously described.[2] Later it was suggested that others preferred to use the high speed, malted milk mixers for this purpose. Mixers of the type shown in Figure 1 have been tried and found to be much more efficient disintegrators than the food mixers previously described. The mixer shown in Figure 1 has one fault in that it is difficult to prevent leakage around the shaft of the propeller which passes through the base of the cup. This difficulty is not found in the type of mixer shown in Figure 2, but the thick glass cup used as regular equipment is not readily sterilized.

* Approved by the Director of the Experiment Station for publication as Journal Paper No. 365, Jan. 12, 1940. The analyses given were made by Raphael Gillotte, Eleanore Heist, and Marion Gillotte. Read before the Food and Nutrition Section of the American Public Health Association at the Sixty-eighth Annual Meeting in Pittsburgh, Pa., October 17, 1939.

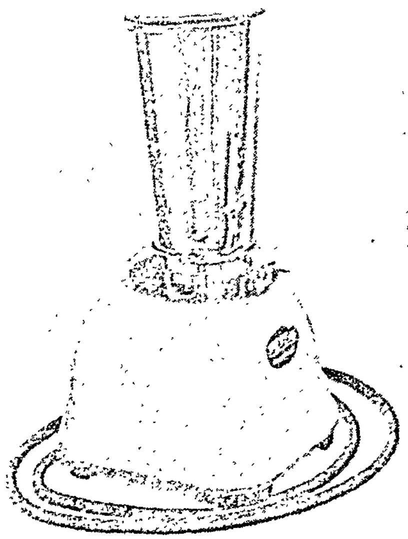

FIGURE 1—Stevens Mixer No. 7291 with No. 5 Container
Stevens Electric Company
Racine, Wis.

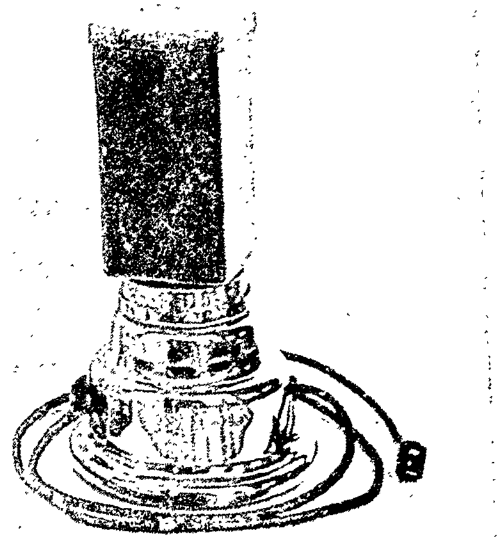

FIGURE 2—Eskimo Whiz-Mix Disintegrator, Model 515 with Special Container *
Bersted Manufacturing Company
Fostoria, Ohio

Hence, in the mixer shown, the glass cup has been replaced by a home-made, nickel plated cup.

In preparing agar plates from pulp suspensions, care has been taken to avoid contaminations, and the work has been constantly checked with control plates. Large size (150 mm.) Petri dishes have been used for some of the work but the only plates of this size on the market are expensive and are made of imported glass that breaks readily.

Comparisons have been made between counts obtained on the old and new standard agars described in *Standard Methods for the Examination of Dairy Products.* Comparisons have also been made between counts obtained from plates incubated at 37° C. and at 30° C. The incubators used were of a type that does not overheat plates, and the temperature in the incubator chamber was carefully controlled.

* Stainless steel cups that do not leak can now be obtained from the manufacturer.

EFFECT OF COMPOSITION OF MEDIUM AND INCUBATION TEMPERATURE ON COUNTS FROM PAPER CONTAINERS AND DISINTEGRATED PAPER-BOARDS.

In order to determine whether the composition of the agar used would affect counts obtained from paper products, comparative tests (Table 1) were made with the old standard nutrient agar and the new standard nutrient agar which contains Tryptone, glucose, and beef extract. No milk was added to the latter agar. Certain organisms grow more readily on yeast extract than on beef extract; therefore some comparisons were made with Tryptone-glucose-yeast extract agar. The containers examined were comparable, though not exactly so, as 578 rinse count tests from a single type of container were made with the old standard agar against 308 with the new standard agar. Incubation in both of these cases was conducted at 37° C. for 48 hours. Individual comparisons indicated only slight increases

TABLE 1

Comparison of Counts from Media Used in Plating Rinses from Paper Milk Containers

Medium Used	No. Containers Tested	Percentage Showing No Growth	Percentage Yielding Counts per Container Between 0–5	6–100	101–250	251–500	Over 500	Maximum Count
Standard Nutrient Agar *	578	30	77	19	1	1	2	8,500
Tryptone-Glucose-Beef Extract Agar †	308	16	67	26	4	1	2	10,800
Tryptone-Glucose-Yeast Extract Agar ‡	284	9	49	38	6	2	5	1,300

*		†		‡	
Peptone	0.5 per cent	Tryptone	0.5 per cent	Tryptone	0.5 per cent
Beef Extract	0.3 " "	Beef Extract	0.3 " "	Bacto-Yeast Extract	0.3 " "
Shredded Agar	1.5 " "	Glucose	0.1 " "	Glucose	0.1 " "
Distilled Water	1,000 cc.	Shredded Agar	1.5 " "	Shredded Agar	1.5 " "
Incubation	37° C. for 48 hours	Distilled Water	1,000 cc.	Distilled Water	1,000 cc.
		Incubation	37° C. for 48 hours	Incubation	30° C. for 72 hours

in count where the new standard agar was used.

In addition to this comparison, 284 tests were made with Tryptone-glucose-yeast extract agar, incubation being at 30° C. for 72 hours. The counts with the yeast extract agar at 30° C. were again slightly higher than those with the new standard agar incubated at 37° C. However, it is clear that the counts obtained from these three different types of agar are but slightly affected by the better nutritive properties of the new agars. Neither does lowering the incubation temperature affect the counts materially. These observations are in harmony with results from numerous additional comparative tests that are not summarized here, and agree with what would be expected from the nature of the bacteria present, all of which grow readily on ordinary media.

Similar comparisons (Table 2) were made from disintegrated paper-board between counts obtained with the old and new standard agars with incubation at 37° C. for 48 hours. The paper-board used was in the form of milk container blanks obtained from five different milk plants, and board used for ice cream cans obtained from a converting plant. In this case the counts taken are not affected materially by the use of the new standard agar. There was indication, as before, of a slight increase in count, but this increase was so slight as to be relatively insignificant. These results again agree with what might be expected from the types of organisms present.

Because Tryptone-glucose-beef extract agar has now been made standard in dairy work [3] it is recommended that future work with rinse counts from containers for dairy products and from disintegrated board be based on the use

TABLE 2

Comparison of Counts from Media Used in Plating Disintegrated Paper-board

Medium Used	No. Disintegration Tests	Percentage Yielding Counts per Gram Between 0–10	11–100	101–250	251–500	501–1,000	Over 1,000	Maximum Count
1. Milk Container Blanks (Obtained from 5 Different Milk Plants)								
Standard Nutrient Agar *	151	44	31	3	9	9	4	1,600
Tryptone-Glucose-Beef Extract Agar *	115	44	31	11	3	6	5	1,700
2. Board for Ice Cream Cans (Obtained from 1 Converting Plant)								
			0–100	101–500				
Standard Nutrient Agar *	130		62	32		3	3	1,700
Tryptone-Glucose-Beef Extract Agar *	216		61	26		8	5	2,000

* For Composition, See Table 1. Incubation 37° C. for 48 hours.

TABLE 3

Bacterial Counts from Paper-board Manufactured for Use in Making Milk Containers Samples Obtained Directly from Mills, Converters and Milk Plants

Mill	*No. Disintegration Tests* †	*Percentage Yielding Counts per Gram of Disintegrated Paper-board* *0–10*	*0–100*	*0–250*	*0–500*	*Over 500*	*Maximum Count*
A	495	46	91	97	99	1	1,085
B	452	23	84	98	100	0	440
C	1,279	17	86	97	99.9	0.1	587
D	163	61	100	100	100	0	84
*	2,877	26	87	94	98	2	10,300

* Summary of production from 13 mills. Includes results from Mills A, B, C, and D.
† Medium Used: Standard Nutrient Agar and Tryptone-glucose-beef Extract Agar. Incubation Temperature: 37° C. for 48 hours.

of the new standard agar. There is no reason to add milk to this agar as there is no milk present in the materials examined.

BACTERIOLOGICAL CONDITION OF PAPER-BOARD USED IN THE MANUFACTURE OF CONTAINERS FOR MILK AND MILK PRODUCTS

In a previous report,[1] the results of the analyses of 978 samples of paper-board were given. Among these, 824 analyses were made from milk container board. At the present time, we are able to give the results secured from a total of 4,623 analyses of a similar type, 2,877 of which were made from milk container board. Comparative counts from board held in storage and some additional results secured in an industrial laboratory are also given as a basis for comparisons.

The results of the analyses secured from the paper-board used in making milk containers are given in Table 3. In a general way, the results are similar to those previously given. Ninety-eight per cent of the 2,877 analyses yielded counts less than 500 per gm. of disintegrated board as contrasted with 99 per cent of the 824 results reported last year. One mill even succeeded in maintaining a record of all counts less than 100 per gm. in a total of 163 analyses. Another mill succeeded in keeping all counts under 500 in a total of 452 counts.

Table 4 gives a report on paper-board manufactured at a single mill beginning in June, 1937. A total of 495 analyses were made and these have been segregated in semiannual periods. There was continuous record of improvement from June, 1937, to Decem-

TABLE 4

Bacterial Counts from Paper-board Manufactured at Mill A Samples Obtained Directly from Mills, Converters and Milk Plants

	No. Disintegration Tests *	*Percentage Yielding Counts per Gram of Disintegrated Paper-board* *0–10*	*0–100*	*0–250*	*0–500*	*Over 500*	*Maximum Count*
1937							
June to December	54	9	72	96	100	0	263
1938							
January to June	64	33	84	95	100	0	396
July to December	93	57	100	100	100	0	117
1939							
January to October	133	33	91	95	96	4	1,085

* Medium Used: Standard Nutrient Agar and Tryptone-glucose-beef Extract Agar. Incubation Temperature: 37° C. for 48 hours.

ber, 1938. However, because of one lot of paper-board that yielded bacterial counts higher than any that had been previously obtained, the percentage of counts less than 500 dropped from 100 to 96 per cent in the period between January and October, 1939. These samples were taken from blanks secured at a single milk plant, and it is probable that the higher counts were due to something that happened to the paper-board after it left the mill.

On the basis of our preliminary studies, a standard of less than 500 colonies per gm. of disintegrated board was tentatively suggested.[4] From these results it will be seen that while high grade mills are normally able to meet a more severe standard than the one originally proposed, conditions occasionally arise where the bacterial counts found are in excess of 500 per gm.

Variations in results such as these are normally found in the operation of any milk plant, and the explanation of the high counts is not always evident. For this reason, enforcement officials normally use some method of discounting these occasional high counts. One standard procedure recommended in the Milk Ordinance and Code of the U. S. Public Health Service is to compute the average bacterial plate count on the basis of the logarithmic average of the last four consecutive samples. This average count is used as the basis for determining whether results are in excess of any particular standard. Other officials use the arithmetic average or a percentage compliance procedure,[5] while still others merely disregard counts in excess of standards fixed if they occur infrequently in a series of routine control analyses.

Because the conditions that govern the size of the bacterial counts of process samples from pulp, paper, and paper-board mills, and from finished papers, appear to be analogous to those encountered in milk plants, the interpretation of counts secured should apparently be on a similar basis. It should be understood, of course, that these counts are counts of harmless saprophytic bacteria and are made as a means of measuring the efficiency of the microbiological control carried out by the plant rather than because counts in excess of any standard fixed represent a danger to public health.

BACTERIOLOGICAL CONDITION OF PAPER AND PAPER-BOARD USED IN CONTACT WITH FOOD PRODUCTS OTHER THAN MILK

Since the previous report was made, the number of analyses made of disintegrated paper and paper-board used for packaging or wrapping food products

TABLE 5

Bacterial Counts from Paper and Paper-board Used in Contact with Food Products
Samples Obtained Directly from Mills and Converters

Materials Examined	No. Disintegration Tests *	Percentage Yielding Counts per Gram of Disintegrated Paper-board					Maximum Count
		0–100	0–250	0–500	501–1,000	Over 1,000	
Paper and Paper-board for Dairy Products Containers other than those for Milk	1,254	53	68	84	8	8	35,200
Bottle Caps or Cap Board and Closures	188	62	75	90	6	4	20,400
Cup, Tray and Plate Stock	102	49	55	66	25	9	1,400
Waxed, Delicatessen and Lunch Paper	202	58	80	94	3	3	58,000
Total	1,746						

* Medium Used: Standard Nutrient Agar and Tryptone-glucose-beef Extract Agar. Incubation Temperature: 37° C. for 48 hours.

other than milk, has increased from the 154 reported in 1939 to 1,746. A summary of the results secured from this series of analyses is given in Table 5. Practically all of the paper products examined in this series of analyses were made from clean and sanitary virgin stock. In a few cases, the board was made with some clean cuttings, clippings, broke stock, or other selected fibers. None of these samples was of ordinary chipboard, strawboard, or other cheaper grades of paper and paper-board.

From the results given in Table 5, it will be seen that while none of the products listed yielded counts quite as low as those secured from the carefully controlled stock used in making milk containers, all counts are low. In each of the four groups listed, some counts were obtained that were in excess of 1,000 per gm. of disintegrated stock. Nevertheless, the maximum counts listed for each of the four groups are only 35,200, 20,400, 1,400 and 58,000 per gm., and these occurred but once. The other counts in excess of 1,000 per gm. were scattered through a series of analyses in which 84, 90, 66 and 94 per cent of the counts were less than 500 per gm. The finished products came from 15 or more different mills which used a variety of raw materials.

BACTERIAL COUNTS OBTAINED FROM PAPER AND PAPER-BOARD HELD IN STORAGE

In order to determine whether growth or death of organisms takes place during the storage of paper and paper-board, 766 analyses were made from 61 samples of disintegrated paper and paper-board stock. These analyses were repeated at the end of 1 to 9 months. Some of the counts were made with standard nutrient agar while others were made with the Tryptone-glucose-beef extract agar. All incubation was at 37° C. for 48 hours.

Forty-six per cent of the average counts were so similar that differences may be attributed to differences in the samples or to differences due to technic. In 6.5 per cent of the cases the count obtained at the end of the storage period was definitely larger than the count obtained at the beginning of the storage, though even in these instances there were a number of comparisons where the differences were not sufficient to indicate definitely that growth had taken place, and there was always the possibility that the differences in count were due to natural differences in the number of bacteria in the board analyzed.

On the other hand, there were 47.5 per cent of the comparisons where the second count was definitely smaller than the first count. Even if as many as 6.5 per cent of the counts that showed decreases were due to factors not controlled during the making of the analyses, there still remain a considerable number of counts in which definite decreases were observed. These data would, therefore, indicate that in some cases, at least, many bacteria die in the dry board during periods of storage.

RESULTS SECURED FROM ANALYSES OF SAMPLES IN TWO DIFFERENT LABORATORIES

Comparative data are available (Table 6) showing the results secured in two different laboratories on essentially duplicate samples of paper-board products, all from one mill. Six different grades of board were represented in this series of over 600 analyses. All samples contained a certain amount of selected

TABLE 6

Bacterial Counts Obtained in Two Different Laboratories from Duplicate Samples of Six Types of Board

	No. Tests	Average Count	Maximum Count	Minimum Count
Mill Laboratory	601	297	2,350	0
Geneva Laboratory	638	242	4,070	0

secondary stock, and the board was made under controlled conditions.

The results not only show that the two laboratories secured essentially the same results when the entire series of analyses is considered, but also show the size of the counts that may be expected where selected secondary stock is used as filler.

Thus it will be seen that the average count secured by the laboratory at the mill was 297 per gm., while an average count on the same material of 242 per gm. was secured in our laboratory. Both laboratories found a certain number of samples that showed no viable bacteria, yielding a minimum count of zero per gm. By chance, the highest count obtained in our laboratory was 4,070, whereas the highest count obtained in the mill laboratory was 2,350 per gm. Neither laboratory showed a tendency to secure higher counts than the other.

SUITABLE PAPER PACKAGING MATERIALS FOR FOODS

In addition to sanitation studies on paper containers for milk and milk products, sanitation and microbiological studies have been made of milk bottle disc caps, hoods, and closures; liquid tight containers for moist and liquid foods; and food wrappers. Problems have arisen in the course of this work concerning improvements in methods of packaging many kinds of foods which vary in perishability and ease of contamination. This has led to an attempt to classify food products according to the latter properties, starting with the most perishable and easily contaminated products. The food products placed in Class 1 are those which may readily become the source of epidemics of gastrointestinal diseases. The moist food products placed in Class 2 are those not quite so readily infected with the organisms that cause epidemics as those in Class 1, while less easily contaminated foods may be placed in other classes, ending with dried foods which obviously do not readily become carriers of the germs of infectious diseases. This tentative classification is given:

Class 1. Milk and Milk Products, Shellfish
Class 2. Dairy Products not Included in Class 1 (Ice Cream, Butter, Cheese, etc.), Frozen Foods, Meats, Fish, Delicatessen Foods
Class 3. Fatty Foods; Bread and Bakery Products
Class 4. Fruits and Vegetables, Eggs, Syrups and Honeys, Dried Foods

Sanitary codes have been suggested or are in process of preparation for containers, closures, and wrappers used in the packaging of foods of Classes 1 and 2, and for converting plants manufacturing these packaging materials. These codes include sanitation and bacteriological requirements for paper products, and sanitation standards that should be observed in their manufacture, packaging, transportation, and handling.

Research indicates that there is a relatively wide selection of materials that may be used in the fabrication of packages for food products. It is impractical to classify categorically suitable fibers. A satisfactory statement of what constitutes proper selection of raw materials might properly specify fibers that are clean and sanitary and that are free from substances which might affect the flavor, odor, composition, or bacteriological quality of packaged foods. In the case of the most perishable foods, the requirement that the stock shall be virgin, chemical or mechanical pulp, may well be added. This standard is, in fact, already being met by the industry.

MICROÖRGANISMS PRESENT IN PAPER AND PAPER-BOARD

Consistent bacteriological control and cleanliness result in the production of paper and paper-board having low bacterial counts which in their normal variations only rarely show counts in the thousands or even ten thousands per gm.

Counts rise sharply and normally remain high when cleanliness and sanitary precautions are neglected. The organisms surviving the drying process are heat-resistant, non-pathogenic types. Drying temperatures are higher than those used in the pasteurization of milk and no pathogenic organisms withstand these temperatures.

The types of microörganisms present in paper-board are much the same as those found in fabricated containers. These organisms, typically heat and dryness resistant, are widely distributed in nature and occur regularly in many places in nature such as in milk and other dairy products, soil, and air. About 90 per cent of the organisms isolated from paper-board and paper containers are saprophytic aerobic, spore-forming bacilli and micrococci. The remaining types are sarcinae, actinomyces, non-spore-forming rods, and filamentous fungi.

Spore-forming bacilli—The most frequent spore-forming bacilli present in paper products belong to the following species: *Bacillus subtilis, Bacillus cereus, Bacillus megatherium,* and *Bacillus mycoides.* Capsulated, gum-forming species are frequently encountered which, because of their similarities to organisms described as *Bacillus peptogenes, Bacillus mesentericus,* and *Bacillus vulgatus,* have been considered as possibly separate species. It may be, however, that these organisms are varieties of *Bacillus subtilis* and of the closely related species, *Bacillus pumilus.*

Micrococci—This group includes both non-pigmented and yellow pigmented species. Organisms were identified according to the method of differentiation suggested by Hucker [6] as closely resembling *Micrococcus albus, Micrococcus epidermis, Micrococcus candidus, Micrococcus ureae, Micrococcus varians, Micrococcus flavus,* and *Micrococcus aurantiacus.*

Non-pigmented and yellow pigmented sarcinae were isolated in a few cases, and actinomyces occasionally appear on plates. Non-spore-forming rods, represented by species which may be placed in the poorly defined genera *Flavobacterium* and *Achromobacter,* were found infrequently. The yeast extract medium mentioned above seems to favor the development of these bacteria and also filamentous fungi. Tryptone-glucose-beef extract agar appears to grow more of the capsulated, gum-forming bacteria and filamentous fungi than the old standard nutrient agar.

Fungi, developing in pulpwood piles include both wood destroying fungi and molds. These organisms include members of the genera *Fomes, Polyporus, Stereum, Trichoderma, Botrytis, Pencillium, Alternaria, Stemphilium.* A variety of molds are also often found growing in pulp mills but these types occur infrequently in finished paper and paper-board. The predominating types of molds isolated belong to the genera *Penicillium, Alternaria, Fusarium, Aspergillus, Cladosporium,* and *Trichoderma.*

High bacterial counts in pulp, paper, and paper-board systems may be due to the utilization by microörganisms of cellulose, hemicelluloses, starch, sugars, and other pulp constituents, contaminated water supplies, the action of microörganisms on starch and other fermentable materials used in sizing and in calender water, growth on equipment and in pipe lines, growth of organisms in felts, development of organisms in stored or re-circulated white water, and the formation of pockets or dead ends which frequently encourage multiplication of bacteria.

DISCUSSION

Many mills, such as newsprint, and book and bond mills, whose products do not ordinarily come in contact with foods, control the development of

microörganisms for economic reasons. They have found that restricting the activities of organisms in mill systems has resulted in better efficiency of operation, increased production, reduced maintenance costs, and the production of cleaner paper. Hence, newsprint mills regularly utilize bactericidal treatments that keep bacterial counts in mills below 100,000 per cc. of white water or stock, not allowing counts to reach figures of 500,000 to several million bacteria per cc., which in the past has been accompanied by production and operative difficulties.

On the other hand, mills manufacturing pulp, paper, and paper-board for the packaging of perishable foods, have gone far beyond a microbiological control carried out for economic reasons and are now maintaining strict microbiological control for sanitary reasons. These mills usually keep bacterial counts in stock systems down to less than 1,000 per cc. In some cases, counts in re-used white water and pulp suspensions are less than 500 and even less than 100 per cc. With such strict control, the bacterial counts in finished paper and paper-board are consistently low. It occasionally happens, however, that during regular production, counts may rise to a few thousand per cc. of pulp suspensions or per gm. of finished paper or paper-board, due to changes in conditions of operation.

SUMMARY

1. Differences in the composition of standard nutrient agars and incubation at 30° C. rather than at 37° C. do not greatly affect the magnitude of the bacterial counts obtained from rinses of paper containers, or from disintegrated paper and paper-board.

2. Paper-board and similar paper products can be more readily disintegrated by using standard malted milk mixers than by using the food mixer previously suggested.

3. Only very few counts in excess of 500 per gm. of disintegrated paper-board were found in 2,877 analyses of milk container board from 13 different mills. Only slightly higher counts were found in 1,746 analyses of miscellaneous food package paper and paper-board.

4. Variations in counts with occasional counts in excess of 500 per gm. of disintegrated stock may be expected even with the best control of conditions now used.

5. Some decrease in the number of viable bacteria present was observed when 61 samples of paper-board were tested after storage from 1 to 9 months.

6. Essentially duplicate counts of over 600 samples of paper-board were obtained in two different laboratories, a fact that indicates that the bacteria present grow readily on the media and at the temperatures of incubation used in these analyses.

7. The bacteria found in paper products are common saprophytic, aerobic, spore-forming bacilli, micrococci, sarcinae, actinomyces, and non-spore-forming rods. Molds present in pulp and paper products belong to the genera *Penicillium, Alternaria, Fusarium, Aspergillus, Cladosporium,* and *Trichoderma.*

8. The paper and paper-board industry has found some form of microbiological control of value for economic reasons. Where these products are used for food packaging, this control is made more stringent for sanitary as well as for economic reasons.

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Microbiology of Paper and Paper-board for Use in the Food Industry*

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PAPER has had an important rôle in the transition from bulk foods to wrapped and packaged foods. Other coverings have at times been introduced but they have not interfered to any extent with the use of paper. Paper manufacturers may be proud of their contribution to sanitation in the food packaging field. Practically all foods, at one time or another, are in contact with paper. If not packed in paper by the manufacturer, most of them are finally wrapped in paper or paper-board when delivered to the consumer. Genuine vegetable parchment has been widely used for some very sensitive foods. It meets the requirements of purity, freedom from taste, odor, coloring, and other foreign matter. It is even stronger when wet, according to Des Autels (1930), than when it is dry. It is also relatively "grease-proof." Paper wrappings of various types are available for practically all foods. Among the more recent innovations in this field is the paper milk container which has already on several occasions been discussed before this Association.

The paper manufacturing industry, similar to other industries, has a decided economic problem involving volume production of suitable paper for food packaging purposes at a reasonable cost. Consequently, in considering results of microbiological investigations of special purpose paper, some degree of conservatism should be maintained. Specific data should be secured and discussed before generalities or sweeping unsupported conclusions are reached. In particular, results should be appraised for their public health significance if sound progress in the field of paper packaging of food is to be maintained.

Many different types of paper and paper-board are made for foodstuffs. Some, such as those made for paper milk bottles, are made from the best raw materials. Those from which packages for some dry foods are constructed are made from lower grade raw materials. They are, however, satisfactory bacteriologically since no pathogen can survive the processes involved in making paper. Pulp is made into paper by a procedure several steps of which possess marked lethal value for bacteria. When pure virgin pulp is used, a clean sanitary product is secured. This has now been supported by several years of research.

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HISTORICAL

No attempt will be made here to present a comprehensive review of the literature. Such a compilation has been made by J. W. Appling of the Institute of Paper Chemistry, Appleton, Wisc. A few of the more pertinent contributions may, however, be referred to here. Much attention is now being given to the relation which microörganisms may have to the steps in making paper as well as to the significance of microörganisms in the finished paper itself. Sanborn (1937) stated that microbiological control is necessary in the paper mill. Most of his arguments centered about microörganisms which were involved in what paper makers have called "slime." This term refers to accumulations of microbial growth which interfere with efficient operation of the paper mill and may produce so-called "slime-spots" in the finished paper. It is not so prevalent today and, although of great economic importance in the paper mill, is of no sanitary significance. It is discussed at some length by some authors but is not a problem in mills in which there is good housekeeping. Later Sanborn (1938) discussed the sanitary condition of paper-board for containers for perishable foods. He believed that paper stock which had been previously used for commercial purposes should not be employed as packaging materials for perishable foods. No evidence was presented that any of the microörganisms were of sanitary importance.

Negro (1938) showed that artificially infected paper yielded viable bacteria after various periods which varied from a few hours to several days; such factors as type and quality of paper, species of microörganism and conditions which obtained in the experiments showed great influence. Under ordinary conditions, the microörganisms used survived several days only when big doses were applied in a thick coat on the paper. Negro stated that he had confirmed the fact that paper is not a vehicle for transmission of the agents causing communicable diseases. His experiments were carried out with 18 types of paper and 8 different species of bacteria. Negro's work seems to have been done with specimens which were very heavily inoculated. Data collected under such conditions may not always reflect actual commercial conditions. Too often the inoculum is both too heavy and not applied in the right manner.

BACTERIOLOGICAL ASPECTS OF RAW MATERIALS USED IN PAPER MANUFACTURE

In producing any article or product fabricated from more than one ingredient, the problem of raw materials must be faced. Raw materials are, in general, regarded as the crux of the condition of the final product. Paper production differs in no manner from production of other materials because the lower the initial bacterial load in the raw materials, the easier and the more effective will be the sterilizing procedure, especially if the bacterial load consists of resistant bacteria. Processing studies have shown that sterility is in part dependent on types and numbers of bacteria in raw materials. It is an obvious advantage to use clean, uncontaminated material with a low initial bacterial load.

Wood Pulp and "Broke"—Examinations of wood pulp, "broke" and pulp sheets have been made regularly. By "broke" we mean sheets of the finished paper which have never been used commercially, although it may have on occasion left the mill. Rejection by the purchaser on the basis of low tensile strength, poor finish, short weight, and caliper measurements necessitates its being returned to the mill where it is again pulped and chemically treated to blend it with new stock. Also, breaks in the sheet at the paper mill during a run may require that some paper be returned

to the pulp beater and reprocessed.

Examinations of wood pulps (foreign and domestic) which have been handled and shipped under good conditions have given a maximum count of 100 colonies per gm., minimum count of 10 colonies per gm. and an average of 53 colonies per gm. Pulp or wet sheets have given a maximum count of 105 colonies, a minimum count of 45 colonies, and an average of 72 colonies per gm. Examination of "broke" gave a maximum of 139 colonies, a minimum of 93 colonies, and an average of 114 colonies per gm. Unquestionably variations from these figures may at times be secured, but all of our work has tended to indicate that these raw materials are of good quality.

Bleaching of Pulp—An important step with pronounced bactericidal value is bleaching of wood pulp with chlorine compounds in the paper mill. The bactericidal value of these compounds is unquestioned. In the paper mill chlorine is used in much greater amounts than in other industries. Although chlorine was introduced into paper making for quite different reasons, it also functions as a powerful bactericide. Chlorination is an effective weapon against bacteria although chlorine resistant species are known. These need more investigation.

At this stage the paper maker has another valuable weapon for controlling bacterial load and that is by lowering the pH. The pH after sizing may range from 3.8 to 4.5; in fact, figures we have secured by means of the glass electrometer show that the pulp before sizing has a pH as high as 5.95 and after furnishing it may drop to 3.88, seldom exceeding 4.5 with the chances of its being closer to 4. A sheet formed with pulp of this pH undergoes a marked bacterial reduction when the web reaches the drying rolls.

Water—Paper mills must have an abundant water supply. They are always placed where there is plenty of water. A mill producing one type of paper may have an entirely different attitude toward its water supply than a mill producing another type. However, mills today appreciate the necessity of using unpolluted water for the production of high grade products such as milk bottle paper stock. Modern methods of water treatment and sterilization make it possible for mills to have a water supply of unquestioned purity. State regulations alone tend to safeguard the water supplies in many instances; there need be no problem of water of questionable purity. Production of high quality paper for food packaging requires safe calender water. Such water is the last material which is added to the paper.

"Whitewater" is the name given to the liquid portion of the pulp-water suspension in a paper mill. It is not sterile and may contain large numbers of harmless microörganisms. Paper mill surveys have shown that the count on "whitewater" varies to a marked degree. A minimum count of 0, a maximum count of 1,800, and an average of 1,184 per cc. indicates quite well the microbial content of whitewater. The use of chlorine in whitewater presents problems because of the readiness with which it combines with the fiber. Residual chlorine tests have shown from 0.2 to 0.8 p.p.m. chlorine present in whitewater and form vats with an average close to 0.4 p.p.m. These concentrations are satisfactory.

Other Materials—Other materials used in paper manufacture include inorganic sizing materials. They may vary with the individual mill but are negligible as sources of microörganisms. Starch added in the finishing process can, on occasion, increase the bacterial load of the paper. The flora of starch was once quite varied and many resistant forms were present. However, edible chlorinated starch is now being used, such as is commonly employed in the canning industry.

In a short experiment along this line, thermal death time determinations were made on some organisms isolated in a paper mill. Data in Table 1 show the effect of efficient germicidal steps in a paper mill has, namely, low pH, high temperatures and moist heat. In the first test *Aerobacter aerogenes* was used after growth on a carbohydrate medium with resultant slimy formation. When *Bacillus peptogenes*, a spore former, was used, a greater resistance was observed. The effect of higher acidity is clearly indicated.

TABLE 1

Thermal Death Time of Slime Forming Organisms

A. *Aerobacter aerogenes*

Suspending Medium	*Form Vat Pulp*	*1% Pulped Paper*	*1% Pulped Paper*
pH	3.5	4.6	7.0
Suspension Count per cc.	16,000,000	57,000,000	50,800,000
Count after 1′ @ 230° F.	0	0	0
Per cent Survival	0	0	0

B. *Bacillus peptogenes (Spore Suspension)*

Suspending Medium	*Form Vat Pulp*	*1% Pulped Paper*	*1% Pulped Paper*
pH	3.6	4.5	6.9
Suspension Count per cc.	2,480,000	2,285,000	2,220,000
Av. Count after 1′ @ 230° F.	358	435	1,783
Per cent Survival after 1′ @ 230° F.	.010	.019	.08
Av. Count after 2′ @ 230° F.	0	0	138
Per cent Survival after 2′ @ 230° F.	0	0	.006
Av. Count after 3′ @ 230° F.	0	0	1
Per cent Survival after 3′ @ 230° F.	0	0	.00004

Other experiments have also been carried out which have yielded significant results. Suspensions of three organisms, *Escherichia coli* (Frank), *Staphylococcus aureus*, and an aerobic spore-forming organism of quite high heat resistances were sprayed on the formed wet sheet just prior to reaching the first bank of drying rolls. We desired to know just what would happen to such organisms when sprayed in large numbers on the web of pulp. In all, 6 cc. of the following suspension were sprayed over a section approximately 12–15 ft. long and 2–3 in. wide.

A. *Escherichia coli*	750,000,000 per cc.
B. *Staphylococcus aureus*	163,000,000 per cc.
C. Aerobic spore former	1,515,000 per cc.

This inoculation was very heavy indeed—much heavier than would be found under actual manufacturing conditions.

The surface temperature for the dryers on which the pyrometer could be used ranged from 220° F. to 235° F. In testing the finished paper only one of the above group was recovered, namely, the aerobic spore former. The counts per gm. of paper of this organism ranged from 150 per gm. to 3,080 per gm. indicating that the section of paper sprayed had been properly taken for testing and thus eliminating the possibility that the technic used failed to recover *Escherichia coli* and *Staphylococcus aureus*. The strain of *Escherichia coli* had been tested in phosphate buffer (pH 7) and at 143° F. and was found to survive 21 minutes in a concentration of 216,000,000 cells per cc. These data confirm that great lethal and sterilizing steps in a paper mill where properly maintained temperatures and pH values are established. Death of *Escherichia coli* indicates that pathogenic bacteria cannot endure the conditions on drying rolls.

It is definitely known in bacteriology that non-spore forming bacteria are very quickly destroyed by moist heat. This has been shown in recent publications by Beamer and Tanner (1939).

Heavy suspensions of such organisms as *Eberthella typhosa, Salmonella paratyphi, Salmonella schottmülleri, Salmonella aertrycke, Salmonella enteritidis* and *Staphylococcus aureus* were destroyed under carefully controlled conditions at temperatures decidedly below those which obtain on the drying rolls in paper mills. The order of death was reported to be logarithmic. Five species of yeast were found to be more resistant to heat than the bacteria just mentioned.

The temperature of the drying rolls on a paper making machine is carefully watched. Such attention is necessary in order to have the machine operate at its maximum efficiency. On one occasion coming under the authors' attention, the temperature in the dryers was 271° F. and the average temperature on their surfaces 251° F. A marked point on the sheet was in contact with the dryer surface for a period of 3 min., 3 sec. Observations on a machine in another mill making the same type of paper-board yielded just about the same results.

BACTERIOLOGICAL EXAMINATION

MILL AIR

In 1937 and 1938, attention was called to the rôle of air in adding microorganisms to paper. It is now our opinion that many of the bacteria reported in paper do not always come from it. They originate in the air and may even come from faulty bacteriological procedures. It is easy for the analyst to contribute a few bacteria to plates. This will be discussed in another publication.

Using the Wells Air Centrifuge, counts of 46 and 69 on paper mill air have been secured on 10 min. exposures. Plates when left exposed to the air near the cutting and rewinding rolls gave counts of 14 and 20 for 5 min. exposures, and 64 and 76 for 10 min. exposure. In a more recent test where it was felt that air contamination was a factor, plate counts ranged from 28 colonies on a place exposed for 5 min. to 164 colonies for a 10 min. exposure. Sterile paper placed in the room where the paper is reeled and cut shows that a small number of organisms may be taken up. The number itself is probably not significant.

Precautions are exercised by paper mills to prevent needless extraneous contamination. It is uniform practice to wrap the individual rolls tightly with heavy stock after cutting. These rolls are adequately sealed before shipment to the converter's plant. At this place the outer paper covering is not removed until the roll is ready to be placed on the converter's machines. When this is done, the outer layers from the roll are discarded and the edges trimmed. Such is the practice for paper milk containers which are made and sealed in the manufacturer's own plant.

Mention is occasionally made in literature of paper making of "slime" formation and that microbiological control is necessary to prevent it. Microbiological control will prevent it if simple "good housekeeping" is accepted as the definition. So-called "slime" is of no public health significance. It is of economic significance to the mill owner because it interferes with the efficient operation of the mill. The microorganisms in slime have been discussed by Sanborn (1933) and by Nason and Shumard (1939). They represent practically all of the ordinary genera.

BACTERIAL CONTENT OF PAPER

Reports of types of bacteria found in paper-board indicate that they are harmless saprophytes of no sanitary significance. Sanborn (1938) reported bacteria from paper-board to be aerobic spore formers and *Sarcinae*. Tanner (1937) also reported the same species.

In Table 2 are results secured on bacteriological examination of over 615 samples of paper-board.

TABLE 2

Bacterial Content of Paper-board

Number Samples Examined	Type Stock	Organisms per Gram 0	1–100	101–200	201–300	301–400	401–500	501–1,000	Over 1,000
51	.012 Body	..	8	22	5	1	..	1	14
62	.014 Body	..	15	32	6	1	1	2	5
310	.017 Body	..	140	77	26	16	9	31	11
3	.020 Spec. Sheets	..	3	..	..	..	..	..	..
99	.024 Plug	2	79	14	2	1	1	..	..
90	.030 End	1	63	15	5	1	3	2	..
Total: 615		3	308	160	44	20	14	36	30

Average — 232.92
Minimum — 0 (3)
Maximum — 4,700 (1)

WHAT IS SATISFACTORY PAPER AND PAPER-BOARD

Investigators in the field of paper microbiology have a distinct responsibility in that they must be careful that the already heavy economic problems of the paper industry are not increased by unreasonable demands for alteration of existing manufacturing practices unless such alteration is to the best interest of public health. Much has been written about "contamination" of paper. The tendency has been to depart from the older definition of the term and to label anything which harbors more than a stipulated number of bacteria as contaminated. The term originally meant defilement or pollution by contact or making impure. The term thus involves quality of foreign substance and not quantity. In hygiene a contaminated object would be one which contains dangerous substances irrespective of the amounts. In publications on sanitary quality of paper, the implication is frequent that because more than a certain number of bacteria per gm. are present, the paper is contaminated. Such is not the case.

Consideration should be given to types of microörganisms present as well as mere numbers. Many harmless bacteria are to be found in every mouthful of food which is eaten. Sanborn (1937), for instance, defined the term contamination in terms of numbers of any bacteria which may reach paper, irrespective of their origin or significance. Strictly speaking, a paper with 10,000 bacteria per gm. is uncontaminated if those bacteria are harmless saprophytes. Paper with 50 bacteria per gm. might comply with arbitrary standards although these bacteria might be dangerous. Such a paper would be almost impossible in the industry. A senseless worship of standards which have been arrived at without adequate laboratory examination and interpretation does not help much. Standards for paper, if they must exist, should be little different from those for the foodstuffs which will go into containers made from it. As Sanborn has stated (1938), standards must be reasonable. He continued, however, to place great reliance on determination of numbers of bacteria in paper as a means of determining its hygienic quality, despite the fact that all of the bacteria which have ever been identified from paper have been harmless species of no significance. In speaking of the bacteriological content of paper milk containers, Sanborn and Breed (1938) said:

> Moreover, when the nature of the few bacteria present is determined it is found that they are common non-pathogenic, spore-bearing bacteria (*Bacillus subtilis, Bacillus cereus, Bacillus mesentericus*, etc.), saprophytic micrococci, sarcinae and actinomyces, and some spores from wood fungi. All of these with many other microörganisms are found

in the pulp suspension as it is carried to the paper machines and over the hot drier rolls in the paper making process. The surviving organisms are all of very heat-resistant types as the temperatures reached are much higher than those used in the pasteurization of milk. No pathogenic organism could survive the temperatures used.

Escherichia coli, accepted widely in the food industry as an indicator of pollution, has never been found by the authors in paper or paper-board. Even when the web of pulp on a paper making machine as described above was heavily inoculated with this organism, it could not be isolated from the paper as it left the machine. The strain used in this experiment was one which possessed greater heat resistance than the ordinary strains. Its heat resistance has been said to be greater than any pathogenic bacterium found in milk.

Practically all who have made observations on the bacteriology of paper have reported that certain bacteria die out rapidly in stored paper. Prucha has reported this in several publications. In one he said:

> Another point of sanitary importance regarding the paper-board is the fact that the non-spore bearing organisms do not remain viable very long on the paper. . . . In these tests plaques of paper were heavily inoculated by being dipped in a bacterial suspension, then placed on open Petri dishes and kept at room temperature. At intervals they were examined for the presence of the inoculating organisms. Organisms like *E. coli* and *B. prodigiosus* usually died in about four days. *Staphylococcus aureus* remained alive for a few days longer. This tendency for the microorganisms to die on the paper might be called "self-purification."

The authors have had ample opportunity to confirm Prucha's observations. Many bacteria die very rapidly on stored paper. This problem is under active investigation, and a more detailed statement will be published later. It is known, however, that storage of paper under proper conditions leads to a constant decrease in numbers of viable bacteria to eventual sterility, for paper is an unsuitable medium for development of bacteria.

What are the requirements to which a paper or paper-board to be used in the food industry should conform? This question cannot be answered for all foodstuffs. It might be possible to permit use of paper made from other materials than for perishable foods. Milk containers, for instance, should be made from new raw materials which have not been used before. They should be made into high-grade paper-board according to the best mill practice.

It has been suggested that paper should be sterile without defining the term. The term has several meanings. For instance, it may be used in the surgical sense implying freedom from living bacteria or other forms of life. Such a goal may be necessary in the operating room, but it is not necessary in other lines. It is not always attained in this place. Foodstuffs are not sterile, and it would be ridiculous to attempt to make some of them so. Milk contains many bacteria, the number depending on the grade. For instance, the milk ordinance and code recommended by the U. S. Public Health Service permits Grade A pasteurized milk to have 30,000 bacteria per cc. when delivered. Thus, high-grade milk is permitted to contain a relatively large number of bacteria because the bacteria counted are of no sanitary significance. In the canning industry the situation is covered by the term "commercial sterility," which means that one edible, sound canned food need not necessarily be free from all living bacteria. To make it so would render it unsatisfactory for food. Therefore, *commercially sterile paper*—meaning a paper free from pathogenic bacteria and related types *(Escherichia coli)* and organisms causing defects in paper—can be made and, in fact, is being made today. The same

definition of sterility may be used in the paper industry that is used in the dairy industry. Such terms as cleanliness and sterility have real significance when used for such a perishable food as fresh milk. These terms also are matters of concern to health officials. Committees of the American Public Health Association have defined "sterile," when applied to milk containers, as meaning freedom from milk-borne pathogens and the further material reduction of all other bacteria. Absolute freedom from all living bacteria is not required. If paper-board is contaminated when it contains a few hundred harmless microörganisms per gm., then such a food as milk which may contain by ordinance as many as 30,000 per cc. is much more so.

BACTERIAL ANALYSIS OF PAPER

Interest in bacteriological examination of paper is not new. It has been carried out in some mills for many years. Interest, however, in this work became greater two or three years ago because of introduction of the paper milk container. Even though the large majority of such containers yield no bacteria with the standard rinse test, the bacterial content of the board from which the bottles were made was considered important. This has made it necessary to give some thought to procedures and "standards." The usual practice in bacteriology when standards are being formulated to control a food product, is to examine many samples produced under various conditions of sanitation to find out just where the line may be drawn between satisfactory and unsatisfactory ones. With respect to paper, many samples should be examined from mills of varying sanitary conditions in order to determine whether a standard may be arrived at which will separate paper made in a clean mill from that made in a dirty mill. Having arrived at such figures they may be used as a yard stick for appraising the product in general.

At the First Conference on Sanitation of Paper Milk Containers held at Geneva, N. Y., July 12, 1937, a tentative standard of not over 500 bacteria per gm. of disintegrated board was suggested. This standard was suggestive only. At the Second Conference at Geneva, May 2, 1938, this standard was reported as feasible and rather lenient. It was also stated that the count on certain boards should not exceed 100 bacteria per gm. where milk or milk products come in direct contact with uncoated surfaces. Those who have worked on the various problems of the paper milk container know that most if not all of the paper-board being used contains far fewer than 500 bacteria per gm. of disintegrated board. The average number might be placed around 80. If standards are adopted they must be properly interpreted. Those who propose them should have some competence. Especially is this true in the paper industry. Bacteriological work conducted during the past two years in various laboratories has not revealed any evidence whatever that pathogenic bacteria can survive conditions on paper making machines.

It is also well to point out that standards are practically worthless without standard methods to use with them. That is the reason for publication of "standard methods" for milk examination and water examination. Standard methods of analysis must go along with "standards." At the present time standard procedures for bacteriological examination of paper do not exist. Each bacteriologist is using his own methods, many of which may be entirely adequate. The great problem in this field is the man who is not well grounded either in technology of paper making or in bacteriological methods of analysis. Such an individual is a menace for he dogmatically interprets standards and

may not even know how to carry out the procedures which give him his counts. If results of paper analysis secured in different laboratories are to be compared, they should be collected by similar methods of analysis. Development of special technic for paper analysis is now in progress. Reports which may be largely suggestive at first will soon be made.

SAMPLING OF PAPER

This is a very important step in all analytical work. Unless samples are carefully collected, and unless they can be handled properly, the results may be meaningless. Sampling of any material to be analyzed is not an easy matter. If the material happens to be a liquid or a powder, the difficulties may not be quite so evident. With such materials, however, as eggs, cans of food, or paper containers for food, the difficulties are more apparent. Examination of one unit may not indicate the situation for all other units. About all that can be done is to examine as many units as possible in order to secure the average condition. Sampling of paper for bacteriological analysis is just as difficult if not more so. It is easy to contaminate the sample by careless handling and manipulation. Bacteria in the air may fall on the sample. The paper maker has to carry an unjust burden in such cases. Every precaution must be made to prevent it.

At present, most of the collection procedures involve tearing out a large piece of paper from which smaller pieces are cut with sterile shears. These latter pieces are handled only by sterile forceps, and should be dropped into sterilized heavy paper envelopes or, better still, into sterilized bottles or cans. Every instrument which touches the paper must have been sterilized. This work should also be carried out as quickly as possible. It should also be remembered that the individual making the sample may contaminate it from his mouth if he talks while he works, or from his nose. Manipulation of a sterilized piece of board under the same conditions as a sample would be taken, shows how difficult it is to collect a sample aseptically.

The ideal procedure would be to have the samples punched from the paper with a sterile punch and fall directly into a receptacle which could be closed and taken to the laboratory or even into the container in which they could be disintegrated. This would make it unnecessary to transfer the samples from container to disintegrating container. The obvious difficulties would be the necessity of sterilizing the cutting surfaces after a sample has been taken, or even sterilizing the entire punch. Furthermore, with heavier stocks the punch would have to be very heavy, and quite expensive to make. However. study of this need might result in development of an apparatus which would work well.

This brings us to the problem of determining the number of bacteria in a gram of paper. After the sample has been taken under carefully controlled conditions, it must be disintegrated under sterile conditions so that it may be plated. Just at present no standard method exists for thoroughly disintegrating paper. Consequently several types of apparatus are being used which vary from simple machines secured at low cost to expensive devices. The latter are not available to many bacteriologists. Most of the disintegration apparatus in use today were prepared for other purposes.

Sanborn (1938) described a disintegration apparatus which made it possible to beat paper into a suspension which could be plated. This apparatus consists of a churn provided with two propellers which grind the sample. His apparatus was really made for a butter churn. By modifying the apparatus he has been able to disintegrate paper-

board. This apparatus has the disadvantage of not being very rugged and will probably be short lived.

A somewhat similar but better apparatus has been more recently introduced. It consists of a malted milk mixer manufactured by the Stevens Electric Company of Racine, Wisc. This mixer has the usual cup with a stirring device which is driven from the bottom. The cup may be removed for sterilization. The apparatus may also be purchased with any number of extra cups so that an analyst may examine a large number of samples in a short time.

Another method which has been used in the speaker's laboratory involves grinding the sample of paper with glass fragments in a sterile glass bottle on a shaking machine. While it is not as convenient as some of the other methods, it has the advantage that special apparatus is not required. If the right shaped bottle is selected, good disintegration can be accomplished in this manner in a reasonable time. Others have added a few steel balls to the glass fragments. This method does have one advantage, at least, that it places a market value on broken glass and old bottles. The advantages of such a method are low cost and a tight disintegration chamber. More study would reveal the right shape and style of bottle to be used, and other conditions which could be improved. One difficulty is to find a shaking machine or rotating device on which the bottles may be placed.

The last method which will be mentioned is probably the best. It is a method by which the sample is disintegrated in a steel capsule or bomb in which are steel balls. The capsule is rotated on a machine at a speed which gives best disintegration. It has the distinct advantage that the sample during disintegration is tightly closed, giving no possibility of air-borne bacteria from entering. With a material with as few bacteria as there are in paper-board, this is important.

BACTERIAL STANDARDS FOR PAPER-BOARD

Advent of the paper milk container caused much interest in "standards." At the First Conference on Sanitation of Paper Milk Containers held at the New York Agricultural Experiment Station, July 12, 1937 (Breed, 1937), it was suggested that board for milk containers should not have more than 500 bacteria per gm. At the Second Conference (Breed, 1938), it was stated that this was a feasible and rather lenient standard for waxed papers. Where the milk came into contact with uncoated papers the standard might be 100 bacteria per gm. In March, 1938, Sanborn stated that it was inadvisable to lower the standard below 500 bacteria per gm.* until more could be found out with respect to the microbiology in paper making.

CONCLUSIONS

1. Paper and paper-board made for use in the food packaging industries is a sanitary product of a high order. It is not only made from clean, sanitary, raw materials but results from a manufacturing procedure in which are several absolutely lethal steps; *i.e.*, cooking, bleaching with chlorine, and hot drying rolls. *Escherichia coli* is not found in paper so made.
2. Methods for bacteriological paper analysis are being developed.

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* Since preparation of the manuscript, it has been reported that the standard of 250 bacteria per gm. based on logarithm average determination, has been approved by the advisory board of the U. S. Public Health Service for incorporation in the 1939 edition of the Standard Milk Ordinance.

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DISCUSSION

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WE have had ample proof that paper pulp and paper packages are quite safe from the sanitary point of view. There really is no public health problem involved in their use. The ideal situation would be to have pulp producers on contract with an agreement that certain plant sanitation procedures always be followed. Huge pulp plants cannot afford to follow any other than the best of practices. However, even though excellent conditions obtain in the manufacture of the pulp and the package, health officers must, of necessity, apply some objective test.

Throughout the literature, and in the two papers presented here, there is continual reference to a standard bacterial count of 500 per gm. of disintegrated paper and also to the use of virgin stock. I take issue with both of these suggestions, not because I feel that the use of virgin pulp and the maintenance of a bacterial count less than 500 per gm. are either right or wrong, but I do not like to see these standards crystallized in the minds of the manufacturers of the pulp, the fabricator of the package, the user of the package, or the housewife.

These standards were not scientifically established. It is just a number that has been attained as shown by analytical results. Perhaps even a count of 500 per gm. is too high. Perhaps this figure is not significant. In any case, we ought not to let this figure become crystallized in our minds. It may play too important a rôle.

Virgin pulp is a fine talking point when selling paper packages to the milk distributor, but even this may not be absolutely essential. Work reported in the literature and our own work indicate that the paraffining process, although not a satisfactory sterilizing process, does result in practical sterilization in that the bacteria on and in the pulp are locked in the paraffin. If this is true, and I think it is, then there is no reason why secondary pulps or pulps made from secondary stock might not be used as fillers and coated with layers made of virgin pulp. This description may not be technologically correct, but I hope we can avoid getting this idea of virgin pulp frozen in the public mind. The cost of virgin pulp may get so high that under conditions prevailing at present, cost differences between 100 per cent virgin pulp board and a filled board might make the difference between being able to use or not to use paper containers.

Incidence of Rabies in Dogs and Rats as Determined by Survey*

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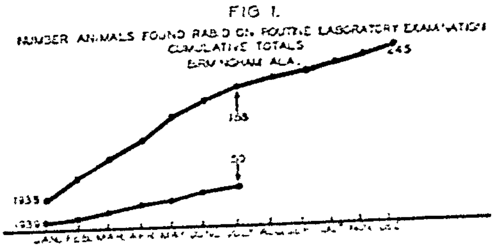
THE estimate of prevalence of rabies in a community is usually based on the number of positive microscopic examinations of animals submitted to public health laboratories by interested persons. Many factors render such information unreliable as a basis for computing total incidence. The actual number of animal heads examined depends upon the availability of laboratory facilities and the extent to which the public utilizes such facilities. The latter fluctuates with public consciousness of the disease, and this, in turn, is influenced from time to time by sensational events such as the death of a person from rabies, the ramblings and viciousness of a particular rabid animal, and the amount of newspaper and radio publicity sporadically directed to the public from various sources. In the South an additional factor results from the large Negro population. The incidence of rabies among Negro owned dogs is entirely unknown. Because of their indifference and unconcern, Negroes rarely suspect the disease and seldom take anti-rabies vaccine as a result of bites.

In Birmingham, Ala., the incidence of rabies in animals, as judged by the number of positive heads submitted to the laboratory, has been high for many years and in 1938 reached a peak of 245.* Current data for 1939 indicate that, for no apparent reason and, certainly not due to efforts at control, the incidence has remained remarkably low. Similar observations have been reported throughout Alabama, Georgia, and Mississippi. In Birmingham only 50 positive heads have been submitted during the first 7 months of 1939 as compared to 188 for the same part of 1938 (Figure 1). These data probably indicate an actual and appreciable drop in prevalence though it is not known

FIG 1.



* Read before the Laboratory Section of the American Public Health Association at the Sixty-eighth Annual Meeting in Pittsburgh, Pa., October 18, 1939.

The studies and observations herein reported were conducted with the support and under the auspices of the International Health Division of the Rockefeller Foundation, the Alabama State Board of Health and the Jefferson County Board of Health.

* Of which 232 were of dogs.

TABLE 1

Rabid Dogs Found on Survey

	Number Killed (Jan. to Aug.)	Number Examined	Number Found Rabid: Total	Microscopically Pos. Mouse Pos.	Microscopically Neg. Mouse Pos.
Pound and Humane Society	3,852	533*	5 0.9%	4	1
	Dead Dogs R'cd				
Incinerator	1,962	477†	25 5.2%	19	6

* Feb. 22 to Apr. 24.
† Mar. 29 to July 27

just how completely they reflect total incidence.

Recently, through the combined efforts of the Jefferson County Board of Health and the Rabies Research Laboratory of the Rockefeller Foundation, operating in conjunction with the Alabama State Board of Health, surveys were undertaken in Birmingham to determine as nearly as possible the true prevalence of rabies and to establish the relation between the data so obtained and data customarily available from routine laboratory reports covering the same interval of time.

RAT SURVEY

The rat has been named on several occasions as a likely reservoir of rabies. It was thought that in Birmingham the high endemicity in dogs might favor a collateral reservoir in rats.

During November and December, 1938, 500 rats were trapped in various locations, care being taken to distribute the sampling as evenly as possible throughout the 52 census tracts in the city. The rats were collected each morning, the brains removed and stored in glycerine. These were pooled in lots of 5, ground with "Alundum" in distilled water, and inoculated in amounts of 0.03 cc. of a 1:10 suspension intracerebrally into each of two mice.

In no instance did rabies develop in the inoculated mice, and the conclusion seems justified that in Birmingham the rat does not play an important part in the transmission of rabies.*

DOG SURVEY

A dog census conducted under WPA auspices early in 1938 enumerated 20,609 dogs for which ownership was established. The actual number was much higher as it was obviously impossible to count ownerless strays. During the year 11,201 were known to have died; 8,466 were killed by the city pound and Humane Society, while 2,735 were killed or died on the streets or at home and were removed to the incinerator.† Among these dogs only 352 were suspected of being rabid and were submitted to the laboratory where a positive diagnosis was obtained on 232. The incidence of the disease among the remaining 10,849 animals is entirely unknown.

To determine the prevalence of rabies among dogs not suspected of having the disease, the brains of apparently normal dogs killed at the city pound and at the Humane Society were examined both microscopically and by mouse inoculation. Of 533 animals examined between February and April, 1939, 5, or 0.9 per cent, were positive (Table 1).

Different results might be expected

* An equal number of rats from Montgomery, Ala., were examined by the same method and with identical results.

† Despite this, a survey conducted early in 1939 enumerated 23,030 dogs.

from dogs brought to the city incinerator by the "dead wagon" for these animals died at home, on the streets, or were killed in traffic. Of 477 such dogs examined between March and July, 1939, 25, or 5.2 per cent, were positive. It is interesting to note that these 25 rabid animals were recovered very largely from areas that are predominantly Negro in population. Of the rabid animals routinely examined by the laboratory only 13 per cent were submitted by Negroes.

DISCUSSION

During the 7 months of study 120 animals were suspected of being rabid and were submitted for laboratory examination; 50 of these were positive. This is the method customarily employed to arrive at prevalence.

If, for the same period of time, the 0.9 per cent of dogs found rabid at the pound and Humane Society is extended to include all dogs killed by those agencies; and, if the 5.2 per cent of dogs found rabid from the incinerator is extended to include all dogs received by the incinerator, a total of 135 rabid dogs is estimated. If these be added to those obtained by routine laboratory examination the total estimate becomes 185 for 7 months.

This survey was conducted at a time when the prevalence of rabies, as judged by laboratory records, was unusually low. It is interesting to speculate what such a survey would have shown in 1938 when the recorded incidence was the highest ever known.

CONCLUSIONS

In Birmingham the rat does not play an important part in the transmission of rabies.

Undiscovered or unsuspected rabies in dogs greatly exceeds the recorded incidence. This, in turn, appears to be unrelated to human mortality which is remarkably low.

It is apparent that field studies, undertaken to determine the efficacy of prophylactic canine vaccination, are of questionable value unless an examination for rabies is extended to include all dogs which die from any cause.

Educating Medical Students and Other Groups Concerned with Registration of Vital Statistics Data*

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IT has been just 300 years since the citizens of the Massachusetts Bay Colony planted the seed of registration of vital facts in America. Since the first registration of births and deaths in 1619, too much has been taken for granted, and until just recently progress has been very slow.

When you read the medical and lay journals written even yesterday, you will find the message on vital facts written as follows: The downward trend of the nation's death rate has been caused by the efforts of the physicians, nurses, public health men, engineers, chemists, and microbe hunters. Even at this late hour the collecting and compiling of vital facts in many cases is looked upon as a minor part of public health work. We in vital statistics are endeavoring to come forward with an agreement on the registration of vital facts that will be reasonable and progressive enough to clear the way for a definite program of instructions.

To accomplish this we must have, as nearly as possible, a uniform rule of procedure in the registration area. Much credit must be given to the Model Law and the coöperation of the Bureau of the Census and the registration executives of North America.

I believe we are approaching at a rapid rate a uniform method of procedure in the registration of vital statistics, because the needs of the public are demanding a uniform method. They observe the effectiveness of the collecting, sending, and distributing of our mail, the taking of the census—both vital problems dealing with man—and today the registration of vital facts is a demanded function of our people, which greatly aids in solving the problem of educating the medical student, physician, funeral director, embalmer, coroner, health commissioner, local registrar, and sextons of cemeteries. What kind of confusion would result in our mail system if we went to the state department of health for our letters and were advised to go to the probate judge's office, and then to the local city health department? With a uniform method of procedure, you will soon find the principles of registration being taught in our local high schools long before the student enters medicine, for in many states today the vital statistics office is a point of interest to the students just as are the libraries and legislative halls.

This procedure has aided in in-

* Read before the Vital Statistics Section of the American Public Health Association at the Sixty-eighth Annual Meeting in Pittsburgh, Pa., October 17, 1939

structing the medical student about the registration of births, the filing of the medical certificate of death, the reporting of sickness, the change in population, and the trend in sickness and death rates.

The theory and method of vital statistics is very valuable to any person associated with the work, but the results of vital facts are more longstanding and will create a greater interest on the part of the medical student, because you are giving him real facts, and when he becomes a part of collecting this information he will not call the state and local registrars meddlers in his profession.

The sources of statistical information and the important procedures are very valuable to the student and others who prepare the original information, but not as creative to him as the tabulated facts presented in a readable form. Columns of facts and figures will never sell registration to the student, but an interesting lecture, news article or illustration will make a lasting impression. The creation of an interest in the mind is a greater problem than the education of that mind.

The physician should understand the value of an accurate birth record to the individual, also the value to society both legal and social, for at almost every important turn in the life of youth as well as adult life, a birth record must be furnished. The physician should understand the reporting of facts of the law in the state in which he practises.

This should include the period of time during which the record must be filed, the name and location of the local registrar of the district, the difference between the place of birth and the residence of the parents, and the laws of the state on legitimacy and the period of uterogestation for a stillbirth, or what is a stillbirth, for the information on legitimacy and stillbirths varies with the respective state laws, which makes it very difficult to have uniform comparable data on these items.

The items on a certificate of birth are very plain, but the medical student should be taught how to make out each item upon the birth record. It is imperative that he note the spelling of the names, the ages of the parents and the number of children born alive and now living; that he be instructed in the prompt, complete, and accurate registration of all births.

The personal and statistical particulars on the certificate of death should be treated in the same manner as those of the birth, but in many states the funeral director or embalmer secures this information through the person best qualified to give it, and the instructor must insist that this information be accurate from a statistical point of view as well as a legal record.

The data we have been discussing are very simple both on the birth and death certificate, but each student should be given actual practice in making out his or her own certificate as well as making out records for members of the class, using standard blanks of the state in which he or she intends to practise.

In talking to a class of students in medicine or in the college of embalming, I often prepare a list of questions including many errors found upon original certificates. The instructor may think it is not necessary to give any special attention to the item of color or race, but we find many physicians using the capital letter "C" for color, when it can be taken to mean Caucasian or white race as well as colored or Negro race.

Medical men in public health work say the most important item upon the certificate of death is the medical statement of the cause of death. This medical statement is one of the greatest opportunities for errors. Often the physician has no opportunity to determine fully the condition causing death. In many cases he does not have the oppor-

tunity to hold an autopsy, and he may desire to conceal the real cause of death for reasons best known to himself.

Under the new arrangement of the medical certificate the physician must give the immediate cause of death, together with other conditions and major findings. Now, how will we best impart this information to the student?—by carefully preparing statements including the medical terms and coördinating statistical information found upon the medical certificate of death, and by having the student make out the medical statement. The funeral director and physician should know how to prepare a death and birth certificate before they start in general practice.

The student should be informed as to the standard nomenclature of the causes of death and have an understanding of the joint causes. I do not mean that we are asking him to classify the original death certificate; however, he should be given an opportunity to underline the cause to which death should be charged statistically. The student should be instructed as to the acceptable terms in the *International List of Causes of Death.* Many physicians believe that the simple statement of pneumonia or fracture of the skull is sufficient, and for a cause of death they are sufficient, but for statistical purposes we must know the kind of pneumonia and the means of the fracture.

The student should understand what constitutes the population of a given area both urban and rural: and how the population is increased and often decreased; the simple means of figuring the estimated population between census years; the relationship of age groups to many diseases causing sickness and death; also the kinship of occupation to certain diseases and the many other factors that he will become acquainted with in his medical course.

The sickness and death rate of any community should be understood by all in the field of public health and medicine. The student should be given some information as to the importance of the various rates in public health work and the formula for calculating the crude birth and death rate, the specific rate, the maternal mortality, the infant mortality, neonatal mortality rate, and the specific morbidity and mortality rate for a disease.

In conclusion, I want to say that the medical student and funeral director should be educated in the methods of collecting the original data, for he or she does not come in contact with the information again until it is returned in a readable form.

Our greatest trouble has been in trying to teach a class made up of some students who only desire to know how to use vital statistics, and others who desire to know how to collect the information. We must know how to educate for both the use and the collecting of vital statistics, and the understanding in the collecting of vital facts results for the most part from doing practise work. To find any value in the methods presented a student must be able to apply them without discrimination.

Needle Puncture Method for Determination of the Bacterial Contamination of Paraffined Milk Containers

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WITH the ever increasing popularity of the paper milk container, public health authorities have naturally taken notice of this package. Before it could with impunity be regularly used in distributing milk, it must satisfy their rigorous demands. While these packages have been under investigation, a considerable literature has developed not only around the container itself, but also around the pulp and other materials from which it is made. The limits of this short paper do not permit us to appraise all of this literature in detail. The studies made on the packages themselves may well be summarized in a statement of Wheaton, Lueck, and Tanner [1]:

> Fiber milk containers are now being supplied to dairies in a nearly sterile condition as determined by the rinse test method approved by several laboratories. Approximately 80 per cent of the fiber milk containers now being used yield no viable bacteria. Of the remaining 20 per cent that do show colonies on plates made with rinse water, over 90 per cent give fewer than 5 colonies per bottle, the greater majority showing but one colony per bottle.

Other investigators have reported similar findings although in several instances a somewhat lower sterility incidence is given.

In most of the studies that have led to the typical results given above, the workers have either used the tests for sterility of bottles outlined in the 6th edition of *Standard Methods of Milk Analysis* [2] or some modification of those methods. The official method calls for the addition of 100 cc. of sterile water to the bottle and the plating of 1 cc. after shaking 25 times. Since paper containers are relatively free of organisms, and since a single cc. out of 100 cc. may not be very representative, actual experience has led to the use of 10 cc. quantities and the plating of the whole amount in either one large Petri dish or three small ones. A further change from *Standard Methods* has been the addition of 20 cc. and the plating of 10 cc. in three plates. In any case, such methods involve a considerable manipulation of container dishes, pipettes, and agar.

A study of these containers has been in progress in these laboratories for some months. During this time certain significant facts have forced themselves upon our attention; hence, this short paper is presented. We naturally had the advantage of previous work, which has indicated the exceedingly high incidence of sterile containers. We had also been verbally warned by other workers in the field regarding the ex-

treme difficulty of properly controlling the experiments. We too found a considerable number of sterile containers—sterile at least from the standpoint of the rinse technic. We too had difficulty with our controls.

Our method varied somewhat from that of the American Public Health Association (we used 25 cc. and plated 1 cc. of this); hence we cannot report containers as having less than 25 bacteria per container. On the basis of this technic, most of our unsterile containers had not more than 25 bacteria. In other words, there was an average of a colony or two per container plate. Obviously, if the normal expectancy of colony per container plate is of this order (1 or 2), then a single colony on a control plate will certainly prove confusing. Not only is this true, but often a rather high per cent of our controls showed growth. Just one unsterile control in five is 20 per cent!

Normally, the bacteriologist disregards such colonies. He feels that they are there by chance and are air-borne. The original object of pouring the controls has been attained—that is, it indicates the essential sterility of his glassware and media. *One organism in one control out of three or four has no significance.* Bacteriology is not an exact science, and such occurrences are accepted as a matter of course. The single organism is not like the tare weight of a weighing dish. On the other hand, had the controls all shown growth, and had the material with which he was working shown a like amount of growth, then the bacteriologist would rightly assume that his media or something else had been contaminated. As it actually happens, such colonies as we are discussing are frequently ignored. Although this procedure may be basically wrong from one point of view, it is exactly what the bacteriologist does. The occasional colony is but a goad to better technic. The bacteriologist makes relatively few controls, and such controls may or may not be free of *all* bacteria. Their presence is frequently a matter of chance and is subject to the laws of such chance.

Although the literature on the subject of these containers gives no intimation of the difficulties involved in this control contamination, we knew that such difficulties existed because we had been so informed. Perhaps the reason why nothing has been written on the subject is the natural reluctance of those concerned to admit a possible charge of carelessness. Yet carelessness is not necessarily involved, since the occasional appearance of these colonies is inherent in the process of plating. We have observed these unsterile controls despite every reasonable precaution we were able to take. A plate-pouring case, access to which was possible only through small armholes, proved of no avail. Various graduate students had similar results. The high incidence of unsterile controls was doubtless due to some factor in our laboratory which might be beyond control. Our plates were poured in a small laboratory separated from a much larger teaching laboratory by but a half partition. This could easily be the explanation of our results. Yet many laboratories are similarly situated. Few control laboratories can afford an expensive plating chamber which would be indicated if our results are at all typical.

It is reasonable to expect that in the near future many laboratories will be subjecting these containers to a searching study. If this control situation proves as prevalent as we think it might, then serious consideration should be given to it.

THE USE OF MULTIPLE CONTROLS

In seeking to explain the relatively high incidence of unsterile controls, a critical experiment of some sort seemed to be indicated—an experiment that

would attempt to show the expectancy of this colony appearance. Accordingly 35 containers were taken and rinsed in the usual way. For each container, a control plate was poured as well as a plate of the rinse water. Every precaution was taken to perform the tasks as carefully as possible. Judging from the results, 9 of the 35 controls were contaminated and 13 of the container plates also bore colonies, indicating that they too were contaminated. Taking this ratio of 13 to 35, one would assume 63 per cent of the containers to be sterile. This is well below the general average reported by Wheaton, *et al.*

From a statistical point of view we may reasonably assume that if the experiments were repeated, we might get 10 control plates contaminated (one more than the previous run), and 12 container plates with a single colony upon it (one less than the previous run). In other words, there was no great significance in either the 9 or the 13 as a measure of the contamination. If, however, we assume some of the container plates to have been contaminated in a manner similar to the controls—that is, if approximately 9 of the 13 container plates were chance colonies—then but 4 should be considered as unsterile in their own right, so to speak. This would give a much higher index of sterility, one more nearly comparable with that reported by Wheaton.

This experiment was repeated six times, with the result given in Table 1. Columns " d " and " e " should be explained. In column " d " is calculated the degree of sterility in per cent as obtained directly from the data. Column " e " on the other hand, gives the sterility of the containers if one assumes the control-plate contamination to be accidental and the container plates to be accidental to the same degree—that is, if the control plates are subtracted from the container plates.

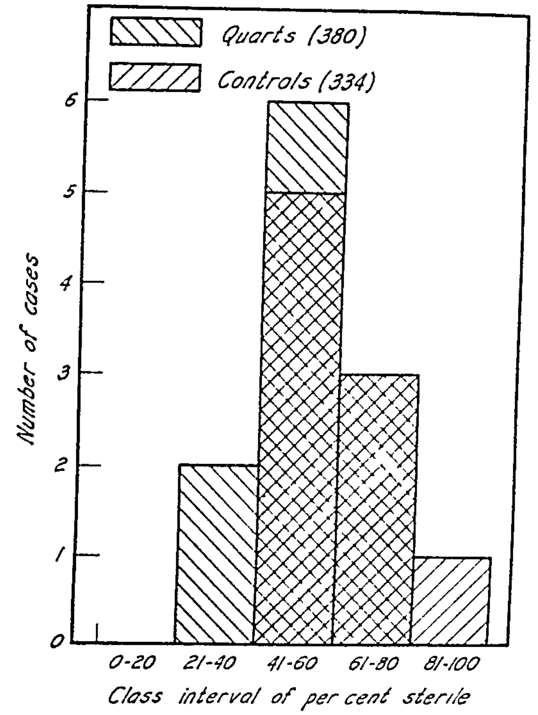

FIGURE 1—Frequency polygon showing incidence of sterility in quart paper milk containers with a superimposed polygon showing sterility of the control plates

TABLE 1

Run	(a) Number Containers	(b) Controls Contaminated	(c) Containers Contaminated	(d) Per cent Sterile $\left(\frac{a-c}{a} \times 100\right)$	(e) Per cent Sterile $\left(\frac{a-(c-b)}{a} \times 100\right)$
1	35	9	13	63	88.6
2	50	27	23	54	108.0
3	50	22	28	44	88.0
4	50	28	36	28	84.0
5	50	9	24	52	70.0
6	25	13	14	44	96.0
7	50	21	22	56	98.0

The data given in Table 1 are presented on the basis of a control plate poured with every container plate. Other data were also available but with a smaller number of controls. These data cover eleven runs in each one of which a certain per cent of the packages were found to be sterile.

Figure 1 shows the frequency with which each per cent sterility was observed. The ordinates show the number of cases of any given sterility per cent while on the abscissa are plotted the per cent sterility in class intervals of 20 per cent.

From this frequency polygon one can note that the most generally observed sterility was about 50 per cent. Such values are frequently found in the literature.

It must be remembered that control plates were also poured and in numbers comparable with the container plates. It is reasonable to assume that these controls are all sterile since that is the purpose of their use. That they were not so, and that the incidence of contamination is strikingly similar to that of the containers is to be noted from the superimposed polygons. The only interpretation that can be placed upon this graph is that the same reasons that caused contamination in the control plates caused a similar contamination in the container plates. A further deduction would naturally follow that reliance cannot be placed in the rinse test as far as numbers are concerned. If a container is found to be sterile, that information is of value. A contaminated container plate is still open to suspicion as to the cause of that apparent contamination.

Again it is suggested that since public health officials are sure to be interested in these containers some method should be devised which would obviate difficulties which we have encountered and which we feel is more general than is at first suspicioned.

THE STERILITY TEST

There are really two tests for the sterility of these containers: (1) the rinse test just discussed, and (2) the sterility test. This latter is merely the addition of a small amount of sterile broth to each container, with a subsequent incubation of the container itself. This test, though used in the past, has fallen into disfavor largely because no idea of the numbers present (" count ") can be obtained. Recently, however, it has been receiving more attention. The 7th edition of the *Standard Methods of Examination of Dairy Products*[3] gives official sanction to the method. This is obviously a progressive step since the numbers of bacteria present in a container is admittedly small. Why then try to determine that count? One container is much less representative of a given lot than is a 1 cc. sample of milk taken from a quart. Unquestionably one must examine a relatively large number of such containers in order to arrive at any concept of the general quality of a lot. That is the only logical procedure if control measures are to be enforced.

THE NEEDLE PUNCTURE METHOD

On our approach to the problem of the sanitary condition of paper milk containers, we were impressed with the ease with which the side walls could be punctured with any sharp instrument. This led to the thought that perhaps sterile broth could be introduced through the wall of the container and incubated *in situ.* Such a technic, if successful, might solve several problems. Some of the packages are difficult to open, it being necessary to lift a staple, or slide a piece of metal, or raise a paper flap with a knife or other instrument. Such operations are hazardous with respect to the possibility of introducing a few bacteria. The piercing of the side wall with a needle would obviate all of these difficulties. Accord-

ingly, this laboratory has evolved a technic that is rapid and efficient. For want of a better term it is called the needle-puncture method.

The apparatus consists of a supply of sterile media suspended in a flask or bottle above the desk. By means of a rubber tube attached to a No. 20 needle the medium is introduced into the container. To guard against contamination, the inoculation is made through a drop of alcohol that has been placed upon the package. After allowing from 30 to 40 cc. of media to flow into the container, the needle is withdrawn, and the hole is sealed with hot, sterile paraffin. As the needle is pushed into the cardboard, it is given a slight circular motion to enlarge the hole somewhat, thus allowing the escape of the air which the media displaces.

The container is now incubated for 48 hours at 37° C., after which it is opened and an observation made as to the presence or absence of growth. This method can be controlled by adding milliliter amounts of the broth to tubes of sterile broth. By this method we have had 100 per cent sterile controls, a result which, compared with the other method, is satisfactory enough. By this method we have shown that about 95 per cent of the half pints studied were sterile, whereas a somewhat smaller per cent of the quart containers were shown to be sterile.

Furthermore, the needle-puncture technic can be used in any laboratory in a routine way or as a check on the production of the containers. That this is so may be seen from an experiment, which we repeated several times. The media supply was set up as usual, but the needle was immersed in a beaker of alcohol. Every hour for 4 days a few milliliters of the medium was run into sterile tubes after the needle had been flamed to sterilize it further. We were able to obtain sterile tubes over a period of 3 days. Surely this is a rigorous test of the efficiency of the technic with respect to outside contamination. We feel that this needle-puncture method has merit; and for this reason we now present it considerably ahead of the completed report of our studies.

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Health Education of the Public*

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THIS summary is based on the discussion of four divisions of a symposium: (1) the spoken word, (2) printed materials, (3) plays, motion pictures, and radio, and (4) exhibits and museums. In the development of a program, it is important to outline a well considered plan and prepare a flexible calendar for each year's work. Basic organization behind the plan is necessary. Just as a university prepares a curriculum, so should the health executive outline a curriculum for instruction of the public by various media. Skilled technicians are necessary. Methods should be devised to measure results of efforts to translate information into action.

SPOKEN WORD

The spoken word includes formal and informal interviews in home and school by teachers, nurses, and other health workers; conferences; and lectures. In dealing with the people who make up the community, "the producers and consumers," of all ages, our aim is to secure behavior favorable for the improvement of health. Among the factors which affect the health status of a community are: ignorance, indifference, inertia, inability to provide or secure adequate services, failure to keep the public informed regarding resources and how to use them or to become active participants in a public health program. Any individual may need and has a right to have health instruction, health service and guidance in the use of health service. There can be no action without interest, no interest without satisfying some want, desire, or urge. Through the spoken word an interest may be developed.

The speaker has the individual or the audience before him. Some of the factors upon which success depends are: appearance, personality, voice (tone, flexibility), diction, enunciation, inflection, and choice of words, in relation to the audience. The speaker can see his audience, watch their response, and personalize his remarks. But there must be preparation for the visit, conference, or interview. Furthermore, the individual or audience must be stimulated to ask "Does this concern me?" "Does this help me to do what I want to do?"

There are supplements to the spoken word, such as a demonstration showing how to do something which the individual himself can do, or charts made as the speaker presents his material, or pictures, or use of a blackboard, all of which may appeal to the eye while words appeal to the ear.

The spoken word is a method of imparting information, but the information must be put into practice. To quote a Chinese proverb: "If you hear about

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a thing you soon forget it. If you see it done, you remember half of it. If you do it yourself, you remember all."

PRINTED MATTER

Printed material (including newspapers, pamphlets, dodgers, posters, etc.) represents another useful medium, to be considered as an integral part of the educational program. This method of expression gives authority to one's statement and supplements the spoken word by providing additional information and a permanent reference. People are reached who may not be approached through personal contact. The material may be studied leisurely at the convenience of the reader, sometimes by a person who may hesitate to ask a direct question. Moreover, communities are thus enabled to share their experiences and program developments.

Practically everyone engaged in public health education uses printed materials prepared in his own department or by some other agency. Since so much material is not prepared exclusively for any one agency, great discrimination must be exercised by the educator so that only literature which will accomplish the desired results will be selected.

Guideposts may be set up which will be helpful in this connection. The first consideration of importance is objectives. One must clearly understand just what we hope to accomplish by the use of each piece of literature. Its authenticity should be unquestionable—Who wrote the pamphlet? If from a commercial source, is it weighted in favor of some product? Is it practicable for your community? Can it be easily understood? Will it arouse interest? Obviously a pamphlet planned for a professional group would not be appropriate for the general public. Racial, religious, national mores should always be considered, so that no group will be antagonized. The worker must constantly keep in mind that what may be acceptable in one section of the country, may not be appropriate in another.

One good way to secure help in deciding what material is appropriate is to experiment with it; that is, to get frank opinions regarding it from a representative cross-section of the group for whom it is intended. So often, material which is clear to one person, is confusing to another of equal intelligence. It will be helpful to obtain as many opinions as can be secured. In this connection, the public health nurse should be especially helpful because of her very intimate contact with the home and the family—the consumers in our public health education program.

A national clearing house, such as the U. S. Public Health Service, could help establish authenticity, but questions of local significance will always remain the responsibility of the worker in the field.

When preparing original material the previous questions and comments are equally applicable. Above all, one should be familiar with the interests and attitudes of the audience to be reached. Two types of information may be included—that which the individual or group wishes to have and that which health authorities feel they should have. The writer should be certain that the source of his information is accurate, and the reader's interest will best be secured if the message is tied in or related to the personal or community life of the individual or group. The facilities of the community should also be considered before urging certain practices. If there are no means of securing diphtheria immunization in a given locality, one should not start his educational program by urging people to immunize children. Facilities should be secured first.

One agency recently issued a pamphlet which illustrates clearly a number of points. Preceding the issuance of

this leaflet which is called "Before the Third Month Begins," an opinion poll was taken to determine how much information people in this particular community had regarding prenatal care. It was found that the majority appreciated the importance of having the mother see the doctor early. Actually, however, expectant mothers did not go to the doctor as promptly as they believed they should. This agency decided not to issue a brochure on prenatal care but to concentrate on getting women under the care of a physician before the third month. The pamphlet issued contains good illustrations and is simply written. The reader is told why it is important for the mother to go to her doctor early, what kind of service he is prepared to give, the cost of his service, and also names and addresses of hospitals where she may receive care. It is too early to know whether this type of appeal will bring mothers to their doctors earlier in pregnancy, but follow-up studies should answer this question.

When manuscript is ready "to go to press," the format demands expert attention—as careful attention as one gives to content. The health educator will do well to seek the advice of an expert in the advertising field.

There is one medium for reaching the general public of inestimable value to public health educators which deserves special consideration, that is, the press. Without the assistance of the press, many campaigns and projects, such as the recent national venereal disease campaign, could not have been advanced so rapidly.

The editor or manager of a local paper is interested in facts and news items which are timely and interesting. Health educators will do well to get acquainted and to break down any barriers which may exist between the health agencies and the local newspaper. In the metropolitan field, the city editor and the editorial writer are both interested in health stories. Usually it is not necessary to prepare material for these people in the form in which it will finally be printed. The city editor should be given facts on which he may base his story, and at the same time these facts and other data which would be helpful for editorial comment should be given to the editorial writer. In small cities, newspapers usually prefer to have material presented in story form all ready for printing.

When material is sent to the newspaper, its author should be clearly indicated so that, should any question arise, the newspaper staff may know with whom to confer. Double spaced, standard typewritten sheets are most satisfactory, and personally typewritten rather than mimeographed news releases usually get more attention. Newspapers use the shot gun method. They cannot prepare their material for just one group of people but must make it appeal to as large a group as possible. Space in the newspapers is precious and so material should be brief. Simplicity and not multiplicity should be the by-word of the person preparing releases. One item at a time should be presented and this repeated often to overcome public inertia. Generally speaking, the newspaper public is unresponsive to one presentation and it is only by constant reiteration that desired effects may be secured. If the story is connected with some local happening or some individual of local fame, the article usually has greater appeal.

Newspapers are interested in community health and welfare and most newspaper people will be found willing and anxious to help improve health conditions of the public. The beat or routine newspaper man may usually be taken into your confidence, and when he understands the reasons why certain facts may not be printed, will respect your confidence.

Any program of health education

must include some means of evaluation. Programs are carried on because people in the field are convinced that the work is needed and that it is helpful. However, so that there may be a minimum of wasted effort, it is well to set up yardsticks by which activities may be measured. Mortality and morbidity statistics are indications of trends in disease which may show the effectiveness of printed materials. The *Appraisal Form* of the American Public Health Association and the questionnaires used in the National Health Conservation Contest measure performance in a community. Health attitudes before and after a campaign may be measured. Bauer suggests a rather detailed questionnaire that describes practices, that may also be helpful. These methods are slow, however, and a number of years must often elapse before results can be estimated. There are a few ways which give us more immediate results. The response to mailing list check-ups, personal conversations, requests for pamphlets, news space given to activities—all indicate the effectiveness of materials. The mother's compliance with quarantine regulations is an immediate test of the value of not only the nurse's visit but also of the printed materials which she uses. Comments received after literature has been sent to a selected group are also helpful. Response to a campaign for tuberculin testing, vaccination, or immunization also reveals the effectiveness of one's educational program.

Although as yet no scientific means are available, these are some of the ways in which the worker may evaluate the effectiveness of the type of printed materials and methods of using them in his program to help each individual in the community to enjoy optimum health.

PLAYS AND MOTION PICTURES

The dramatic method of presenting health information is one which has often been neglected, and in the use of community plays and pageants an opportunity to make use of amateur community skill should not be overlooked. This method has drawbacks and should only be used under the direction of competent leaders. The community and pageant method in health education makes use of subtle indirect approaches to health education. In the analysis of the use of puppet and marionette players, it is observed that the illusion of realty is a lasting impression, that the puppet actor was in existence long before the human actor, and that in competent hands puppeteering can be used to tell the stories of health, for debates on proposed legislation, and to present ideals of health and social work.

In the use of films for health teaching, one must at the start ignore the strictly entertainment films such as are produced in Hollywood. Two types of films may be used, the documentary or propaganda film, such as "The River" and "The Plow That Broke the Plains," and the strictly educational teaching film. As we cannot produce on the screen everything that we see in life, we must concentrate on one main theme. Films cannot tell all the story; therefore the documentary film is propagandizing.

It is not necessary to dramatize a film in teaching. In documentary films there is a combination in which one part may be dramatized and the other part may be straight teaching. In using this type of film for teaching, a discussion must follow the showing of the film. One interesting experiment was tried in which films were used as background material for lectures. A group of people having widely varying viewpoints can get on common ground by producing a background of information through a film, thus securing equal footing to start a lecture. It is difficult to

obtain films in the health field, and there is need for production.

The use by Hollywood of health information films was noted with the prediction that this may be a vehicle of greater use in the future. Whereas five years ago Hollywood would not produce a picture with health information because it would not be good for the box office, producers have learned that a health film can be profitable. A movie which contains public health material will affect many varied groups all over the world at different levels of education and intelligence.

Much criticism has been leveled against inaccurate treatment of health subjects by Hollywood. Of course, the studios turn out both good and bad pictures. Technical badness, from the point of view of the health worker is said to be due mainly to carelessness in reviewing the script and checking properly, or in producing the scenes. There is in Hollywood a corporation recently started which specializes in taking "shorts" of vital interest. Many of these will probably take up public health problems. A story must be appealing and dramatic, and therefore some liberties must be taken at times in technical fields. However, on the whole, producers stick to the spirit of the fact if not to the letter. A health educator must not be too critical of details which to him seem very important but which in general effect put over the message he desires.

The amount of research and study that goes into a Class A film is tremendous. Often interesting but little known facts can be dramatized in a film and the dramatic presentation only adds to the educational value. A picture now in production, "The Life of Paul Ehrlich," required 6 months of research on the locale, time and period, characters, etc., before the script was written. The studio has no way of judging a man's technical work except for his own or other people's word; therefore, the studio sometimes makes mistakes in choosing a technical adviser. As a result of this session, the Western Branch of the American Public Health Association appointed committees to assist both radio and moving picture producers to obtain competent technical advice.

RADIO

The question, "Do People Want Health Education?" was answered in the affirmative by a man who is not a professional health educator. The average response to a radio health program is measured by the number who send for booklets after the talk. Interest in general is on the negative side of health rather than on the positive. If the talk is on health hazards or some specific pressing calamity, people are more interested than in a talk telling how to keep well. Persons with an individual or personal interest in a particular disease are interested in hearing more about it. From a broadcast on diabetes and a new type of insulin a large volume of responses was received. Radio education must be sugar coated. It must be wrapped in all the finery used by successful sponsored programs.

In a radio program on scientific subjects only the mere fundamentals and the highlights can be given. The main purpose is to arouse enough interest in public health problems to have the listener find out where he can get more information, and then get it. This could be done by having popularized booklets distributed to people who inquire, giving details and technical advice. This it seems, in the mind of experts, is a better plan than to give advice over the radio. A specific suggestion was made that a few moments be obtained on a commercial, standard program with built-up listeners. If a brief message is given by a physician or other authority telling where further information may be obtained, the results will be gratifying.

Efforts should be made to evaluate the success of health plays, motion pictures, and radio programs. It is important to know the results of pageantry in terms of improved health conduct. This is in the end the main objective and perhaps health workers have neglected to find out whether they have killed any birds with their rifles and their shot guns.

Broadcasters are anxious to coöperate with legitimate educational projects. Radio staffs frown upon hundreds of assorted organizations which seek free radio time for promotion of publicity campaign for special interests. Many seek to masquerade under the guise of educational programs. Health groups need to coördinate their radio efforts through central clearing committees. Public health groups can secure favorable public attention by tying in their work with programs already well established on the air. Radio news broadcasts on the regular schedule household hours are examples. Round table broadcasts offer another opportunity for public health groups to promote their work. Such programs as the "American Town Meeting of the Air," "The People's Platform," and other broadcasts of the forum type are good channels for familiarizing the American people with public health developments.

Radio has changed our social environment and has become a powerful factor in the molding of public opinion. Because it is the desire of the broadcasters to have educators use this medium, a great amount of research development work is going on, principally under the direction of the Federal Radio Educational Committee, financed by contributions amounting to more than ¼ million dollars, raised among broadcasters, networks, educational foundations, and the United States Office of Education. In view of this committee's study, it appears that the best results are obtained when broadcasters and educators combine their efforts and abilities. If radio is to serve well, there must be a mutual understanding between the two.

The extent to which education for grown people should find a place in the balanced program schedules of American broadcasting systems is an important subject which broadcasters are endeavoring to decide. Recently the National Association of Broadcasters adopted a code embodying the pledge of increased recognition of the importance of educational programs. There is altogether too much duplication of effort in health broadcast attempts. The opinion was expressed that:

> . . . apparently, well meaning organizations are still individualistic, and the eventual results they hope to achieve, and for which they are established, are secondary to the publicity that they hope to get. Just think of the many programs on the air under the auspices of organizations which profess to be educational. Analyze them and see if they are instructive, informative and interesting. You will probably discover that many are merely roughly put together features of publicity.

Determining what is of genuine public interest is part of the broadcaster's job. He must call on all his experience to decide whether the campaign brought to them will attract listeners, lose listeners, or merely keep the audience that is turned over when a period is assigned to a so-called educational program. Radio has never taken an editorial stand. That is the foundation of the American system of broadcasting. That radio seeks to give expression to all points of view in a community is evinced by the revised code:

> "As part of their public service, the networks and stations shall provide time for the discussion of public questions including those of controversial nature. Such time shall be allotted with due regard to all the other elements of balanced program schedules and to the degree of public interest in the question to be discussed. Broadcasters shall use their best efforts to allot such time with fairness to all elements in a given controversy. Each of the 700-odd broadcasters of this country has been granted a license to operate by the

Federal Communications Commission on the basis of 'public interest, convenience and necessity.'"

In a large San Francisco station in a typical week in December approximately 8.5 per cent of the sustaining or non-sponsored time and nearly 5 per cent of the commercial sponsored time was devoted to educational features.

There is nothing in the federal regulations regarding educational programs, and the extent to which each station or network goes into this field depends entirely upon itself. Our broadcasting critic said: "Of all the educational programs on the air, it seems to me that health subjects are the least represented. Why should this be? Health is one of the closest and most important of all things. Health education on the air cannot be founded upon an occasional talk or lecture. It must be built on a well developed plan directed by capable and trained people. In this age of specialization radio employs engineers, officers, producers, writers, editors, and others for specialized tasks. Persons seeking to use radio facilities should understand more fully the need for specialized training before appearing on the air. The first step is to secure a little booklet published by the National Association of Broadcasters, Washington, on the topic "How to Use Radio." It will be of benefit also to get acquainted with the University Broadcasting Counsel of Chicago which annually uses radio time contributed by stations to the value of one million dollars. Their success may be attributed to a professional staff skilled in radio technics. A presentation can be made competitive if it is a professional production. It should be an important part of the work instead of a side line. This may take money, but if radio is important to your work then money should be found for it, just as it is for other activities.

One way of capturing listener's attention without money, yet with a successful vehicle, is to tie in with programs which have a following. An example was the link of the California Tuberculosis Association with "One Man's Family." The association's radio contact man went directly to the author of "One Man's Family" and asked him to write a little scene about Christmas Seals for his play. The author obliged, and the benefits obtained were far greater than could be realized by many medical talks.

A suggestion to small organizations who have radio time is the interview. The interview type of program is easier to produce than a dramatic skit or the musical program which require highly trained script writers, actors, and performers, or the exceptional person who can talk for 15 minutes on the air. In the interview type program one does not have the difficulties of the other three. The script should be written by one person. With a little practice a writer can produce acceptable radio interviews which will hold listeners.

And a word about performers or participants—Don't try to do it all yourself! Secure leading members of your state and your community to take the parts. Select your subject first, and then select people whose names are known in the community and who have a general reputation for thoroughly understanding the subject.

One health and radio worker epitomized the gist of radio wisdom in one question—"Do you remember what radio programs you deliberately tuned in on last night and the ones you deliberately tuned out? Can you write down your reasons for those actions?" If you can, you are well on the road to knowing what health and welfare agencies should do about radio. Certainly, such agencies should use radio. The number of families owning radio sets has risen from 12 million to 28 million since 1930, and including auto-

mobile radios and extra sets the grand total of 41 million sets are in use every day.

In the symposium, the use of radio transcriptions in health work, especially with the smaller stations, was stressed. This is a field which has not yet been thoroughly developed by health workers as an avenue of health education.

EXHIBITS

There is no simple rule that can be set down to guide one in the preparation of an exhibit. There are more intangible factors in this medium than in the others discussed. It is a medium that has been neglected for many years, but is due for a general expansion because of the mechanical ingenuity of exhibit builders and artists. Perhaps there is needed a central distribution point for material which exists and a central distribution point of ideas. The center and core of an exhibit is an idea. Its secondary feature is the execution of the idea if the idea is placed in skilled hands. In designing an exhibit one must take into consideration the exhibit audience and the exhibit circumstance. Is it to be a general exhibit for all types of persons, or is it to be an exhibit for a chosen group? An exhibit for a world's fair would differ from an exhibit designed for a conference of student health experts.

To analyze the exhibit audience, questions must be raised: What is the economic status of the visitors? What is their educational level? What is the predominating occupation of the group? Is it a large audience? Is it small? Is it repeating? Is it changing? What is the psychological state of the audience? What are the headlines of the local newspaper this month? Is the audience predominately rural or urban? Other factors to be studied are whether the exhibit is to be in a county fair, a railway station, an amusement resort, a schoolroom, or a public building lobby, an auditorium, a convention, or a store window.

One of the greatest difficulties in preparing a health exhibit is the criticism, on the one hand, of the scientist regarding the technical details and on the other hand, the error of the designer in gauging what impression the lay group will get from the presentation.

It is necessary to show people something they like. An exhibit should always appeal to visual delight. An exhibit must give pleasure as well as information. It is usually impossible to know just what is going to appeal to the public. It is as uncertain as to whether or not a play will "click." It has been said that a museum or an exhibit is a collection of people surrounded by objects. In entering an exhibit room, 74 per cent of the people turn to the right. There are counterirritants to be named which prevent this tropism from full play, such as bright lights, obstacles in the path, and the like. The average time spent in looking at an old masterpiece is said to be 8 seconds. Most people become lost in an exhibit. A well planned exhibit makes it easy for them to get oriented. People do not like to be coerced. They may see from the baseboard to about 7 or 8 feet in height. From 2 feet up to 6 feet in height is the optimum position for advantageous display. The more shown, the less will be seen, as illustrated by a simple psychological experiment. A tray of objects shown to subjects for a limited time revealed that the more objects placed on the tray, the fewer objects were recalled. Free space above the exhibit is essential.

People do not like cold, forbidding walls or too much light. Warm pastel tones and the proper number of footcandles of light are desirable. The most strategic zone is that which is covered by the head of the man in front. A person will wait to see what someone else is looking at.

The sources of assistance which can be tapped are many. The various federal and state agencies, scientific firms, art projects, and manual training schools can be used. Also men and women with hobbies in small communities can assist. Participation increases the local field of interest and application.

Enrollment of Medical Technologists

AT the request of the Surgeon General of the Army and in compliance with its policy of coöperation with both the Army and Navy, the American Red Cross, as an expansion of its peace-time service for the military forces, has undertaken the enrollment of various types of medical technologists who are willing to serve in the medical departments of the Army and Navy if and when their services are required at the time of a national emergency.

Persons with the following qualifications will be enrolled:

- Chemical Laboratory Technicians (male)
- Dental Hygienists (male and female)
- Dental Mechanics (male)
- Dietitians (male and female)
- Laboratory Technicians (male and female)
- Meat and Dairy Hygienists (Inspectors) (male)
- *Nurses (male)
- Occupational Therapy Aides (male and female)
- Orthopedic Mechanics (male)
- Pharmacists (male and female)
- Physical Therapy Technicians (Aides) (male and female)
- Statistical Clerks (male and female)
- X-Ray Technicians (male and female)

General qualifications for enrollment are as follows:

1. Citizens of the United States.
2. Ages 21–45 years (Army); 18–35 (Navy—*men only*)
3. Physically qualified. Applicants must pass a satisfactory physical examination, according to standards set respectively by the Army and Navy Medical Departments.
4. Women applicants must be unmarried.
5. All applicants must express a willingness to serve as a technologist in time of a national emergency.

Male technologists will be eligible for enlistment in the Army as non-commissioned officers in the grades of sergeant, staff sergeant, or technical sergeant. Women technologists, and men who do not qualify physically, will be eligible for employment by the Army as civilians.

For the Navy, male technologists will be eligible for enlistment in the Naval Reserve as Petty Officers—Pharmacist's Mates, 3d, 2nd, and 1st Class and Chief Pharmacist's Mate (acting appointment). Women technologists are not eligible for service in the Navy under present plans.

The Medical Department of the Army will require a considerable number of technologists in each of the above named groups. The Navy Medical Department requirements will be similar except for dietitians, occupational therapy aides, orthopedic mechanics and dairy and food hygienists (inspectors) who will not be needed. Notwithstanding the maintenance of this enrollment, the Navy also desires peace-time enlistment in the U. S. Naval Reserve, and *male* technologists who wish to enlist in the Naval Reserve are urged to communicate direct with the Commandant of the Naval District in which they reside. The address of their Commandant will be furnished upon request.

Technologists who qualify according to these general standards and who are willing to enroll for service as outlined above should communicate with The American National Red Cross, Washington, D. C.

* This group will not be members of the Army or Navy Nurse Corps which under basic law are limited to females, but will be used as technologists for service auxiliary thereto

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SKIM MILK—A NEGLECTED FOOD

AT our Annual Meeting in Pittsburgh (1939) we had one paper of unusual character [1] which called attention in a striking way to a great and increasing waste of a valuable food—the use of skim milk for manufacture of various articles. The subject deserves careful study by social and economic workers interested in the proper feeding of our people.

The League of Nations has recognized this problem and deplores the prejudice which exists widely against skim milk not only as a waste of food in itself, but because it results in a reduction of the total milk consumption. They point out, what is well known, that the nutritive value of skim milk is not impaired as far as the mineral and protein contents are concerned, but only by the removal of the butter fat and the vitamin A which it contains. Skim milk, being much cheaper than whole milk, is within the reach of many low income families. Apparently the only other protest on record came from the Minister of Agriculture of Canada in 1936.

The milk production of the United States is more than 100 billion pounds annually, of which between 46 and 50 per cent is separated to obtain the cream. Some 50 billion pounds of skim milk are fed to animals or destroyed annually. Only about 12 per cent of the skim milk produced in the United States is used in the manufacture of dairy products, and there are no statistics as to the amount which is fed to animals and so utilized indirectly as a food product. Enormous quantities of casein from skim milk are used for sizing, paints, and various products like buttons, artificial ivory, brush backs, etc., which many believe should be made into cheese, for example, which has the approximate food value of lean meat.

From the economic standpoint the use of skim milk for feeding animals can be defended. Hogs, for example, store in their body tissues 66 per cent of the milk proteins of skim milk, against 23–27 per cent of the proteins in grain, and a calculated mixture of the two enables pigs to make 62 per cent of the proteins into body tissue. However, as pointed out in the article under discussion, in spite of this, 90 per cent of the food value of skim milk is wasted when fed for the

production of pork, so that even here the feeding of this valuable human food, which pound for pound is equal if not superior to the nutrients in pork, is a waste.

Even these statements, which are authentic and verified by the U. S. Department of Agriculture, tell only a part of the story. The chemists some time ago forced us to question the truth of the old adage about not being able to make a silk purse out of a sow's ear. Incredible as it seems at first sight, we are now making a good substitute for wool out of skim milk, and there is a large and increasing use of whey for the making of solvents, plasticizers, lacquers, inks, etc.

In other words, there is a growing commercial use of the casein of milk for conversion into fiber closely resembling wool and having some advantages over wool in that it does not shrink so much and can be worn next to the most delicate skins such as those which cannot tolerate knitted wool. Also the fineness as well as the length of the fiber can be regulated at will. It has certain disadvantages such as beset rayon in its early days.

The milk we produce each year contains 2,700,000,000 pounds of lactose, much of which can readily be made available for the manufacture of lactic acid. In 1938, 5,000,000 pounds of lactic acid were made in this country. It has many uses—some of which are in the making of food products, drinks, and medicine; but it is largely used as a catalyst and plasticizer in the casting of phenolic resins, while its many derivatives are of great value in the field of solvents, lacquers, plastics, inks, etc., and so lost as food.

As to what may be expected in the comparatively near future, it is stated[2] that there is an annual supply of 40 billion pounds of skim milk above what is now converted into manufactured products, which is equivalent to one billion pounds of casein or of casein fiber, and this is more than twice the consumption of wool in the United States at present.

The dairy people are said to favor this utilization of skim milk for various manufactured products and some of our agricultural colleges advocate it as a means of profit in the dairy business. Indeed, in April, 1939, there was a joint symposium on the "Industrial Utilization of Dairy Products" at the meeting of the American Chemical Society in Baltimore, before which papers containing many of the above facts were brought forward and discussed.

Remarkable as these developments are from the scientific standpoint, and useful as these new products may be, we need have no concern with them in a journal devoted to public health except that they represent a present and growing diversion of a food product which ranks among the best.

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LEPTOSPIROSIS

MORE than two years ago we called attention[1] to the growing notice which spirochetal jaundice was receiving in the scientific press, and this has continued. One can hardly escape the conviction that the disease is spreading and certainly there are reservoirs of infection in this country as well as others which demand our attention.

Human leptospirosis under the name of Weil's disease, which may be called the classical type, has been observed in 44 countries, situated in the 5 great

divisions, Africa, America, Asia, Australia, and Europe, yet the compiler of this list[2] states that he cannot guarantee it to be complete.

It may be recalled that the study of Weil's disease, first described in 1886, was placed on a sound basis by Inada and Ido, in 1913, by transmitting the disease to guinea pigs, and further, in 1914, in isolating the Spirochete which they called *Spirochaeta icterohaemorrhagiae,* but which is now known as *Leptospira ictero-hemorrhagiae.* It is likely that some of the apparent increase in the disease is due to better diagnosis and the fact that we are now looking for it. The rat [*Rattus rattus* and *Rattus norvegicus* (Manson-Bahr)] seems to be the chief reservoir of the classical form of Leptospira. Experimentally they may remain carriers 3 to 4 months, and in Amsterdam, wild rats have been found which remained carriers for as long as 2½ years. Klarenbeek and Voet state that infected rats continue to excrete Leptospirae in the urine for the rest of their lives. It is believed that they get their infection in nature either through food contaminated by urine of a carrier, by bodily contact, or by contact with infected material, particularly if the animal has open skin lesions. From them it is transmitted to man by the use of food or water contaminated with rat urine, or handling contaminated material, and as observed in the United States, by working in sewers. Other sources of infection are trades, such as fish handling, cultivation of certain plants, as cane, rice, etc., growing in swampy areas, during which small skin abrasions allow organisms to enter the body. Infection through water, bathing, swimming, accidental falls into water, are methods of infection, and in Amsterdam particularly, accidental falls into the canals of that city seem to be the chief mode of infection. There is a great predominance of cases connected with water, over those in which contact with rats has been observed, and this is true in almost every country, whether the Leptospira is of the classical type, *Leptospira icterohemorrhagiae,* or some other variety.

Dogs have been recognized as carriers of the *Leptospira canicola,* but only recently has any extensive investigation been made of the disease in dogs or of its danger to man. This study[3] was instigated through the observation of the Director of the Hospital of the Society for the Prevention to Cruelty to Animals, in San Francisco, of a highly fatal disease which was observed with increasing frequency. This led to a study of the various types of the disease as seen in dogs, and, more important from our standpoint, to the dog as a carrier and possible source of disease to mankind. Of 47 dogs taken in the vicinity of San Francisco and in rural northern California, 16, or 34.04 per cent, showed evidence of contact with *Leptospira canicola.* Of 28 dogs from Santa Rosa, 4, or 14.3 per cent, gave positive reactions. As contrasted with the East, 111 sera from the vicinity of New York City collected from 13 breeds, only 10, or 9 per cent, agglutinated *Leptospira canicola.* It is estimated from tabulated observations that from 2 to 46 per cent, or about one-fourth of the dog population in different countries examined at a given time show evidence of a Leptospira infection. Probably between 20 and 50 per cent temporary or permanent canine Leptospira carriers and shedders may be expected in this country.

There is no accurate index of the infection of rats in this country, but examination of the kidneys of 467 showed that 76, or 35 per cent, were infected with Leptospira. Of these, 23 strains were isolated by guinea pig inoculation and all identified as *Leptospira icterohemorrhagiae.* The *Leptospira canicola* has not been encountered in the rat population.

The danger of rats has been clearly recognized in practically every country.

However, aberrant human infection due to the *Leptospira canicola* have been found at least 21 times, 12 in Holland, 1 in Austria, 6 in Denmark, and 2 in California. The diagnosis in man of a Canicola infection is difficult since most cases have no jaundice, resemble influenza, or run a course similar to undulant fever.

The chief danger would appear to be to veterinarians and those constantly exposed to dogs. It must be remembered also that Weil's disease due to the classical strain occurs in dogs. The urine of dogs which have been infected with Leptospirae can be cleared up by an exclusive meat diet or by hydrochloric acid in the drinking water, which renders the urine strongly acid and unsuitable for the organisms. This is advised as a remedy against the carrier state and protection for contacts.

In San Francisco the hemorrhagic type of leptospirosis is predominant in adult dogs, and is often confused with black tongue. Meyer believes that progress in handling the disease has been greatly delayed on account of the widely accepted idea that every case of canine black tongue is due to a vitamin G deficiency, and gives strong evidence that such is not the fact. Veterinarians particularly should be on their guard in respect to this.

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RESEARCH IN WAR TIME

AMONG the unfortunate results of war are the interruptions or discontinuance of peacetime activities which make for the public good. One of the more deplorable of these is education, particularly in the professional branches, such as occurred during the World War of 1914–1918, when in some countries medical education was interrupted to such an extent as to lead to a shortage of medical officers. It is therefore especially gratifying to learn from the *Lancet*[1] that many lines of research are going on in England, practically uninterrupted. It is true that it speaks chiefly of conditions in and around London. The Research Department of the Royal College of Surgeons has closed down, its staff having "taken to the transfusion of blood." There has been a reduction in personnel in a number of places, but most of the essential work is going on. Under the Medical Research Council such work as is regarded worthy and profitable will continue. The work of the Wellcome Physiological Research Laboratories is not likely to be diminished, since much of it may bear directly on material needed for the war.

The study of cancer under the two great agencies in England will continue almost as fully as before the war. Chemotherapeutic research in the laboratories of May & Baker will be continued as far as possible, as well as the investigation of the manufacture of foreign drugs.

As far as research goes this report is good. The *Lancet* also tells us that there is no slowing up of the flow of original articles offered for publication. However, readers of most English journals, such as the *Lancet* and the *British Medical Journal*, as well as the journals on public health, cannot but be struck by the change in character of the published articles. For more than a year precautions against air raids have been studied and discussed, plans for evacuation have been made, and, as we know, carried out on a large scale just after war was declared,

so that one cannot doubt that there is a deep-seated change in the attitude of the medical world at least, on whom so much responsibility comes with war. Certain advances have been attained, such as the collection of bloods for transfusion, their shipment to depots in France by airplanes, and their distribution at the front.

It was impossible to read of the evacuation of the women and children from the large cities without wondering at the efficiency of its achievement and speculating as to the future. Already there come disturbing accounts of the condition of the women and children.[2] The children are even more poorly nourished than those in a receiving area, which has suffered from trade depression for a number of years. The dietetic habits of both the women and children are far from correct. Pediculosis, scabies, and impetigo are common and " there are signs that the mixing of the bacteriological flora of town and country is having its anticipated effect."

In view of the many things which necessarily divert attention and efforts from their normal channels, the information given in the *Lancet* concerning research work is particularly gratifying.

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TURKISCHE ZEITSCHRIFT FÜR HYGIENE UND EXPERIMENTELLE BIOLOGIE

THROUGH the courtesy of Dr. Emil Gotschlich, First Director of the Turkish Central Hygienic Institute, we have received Nos. 1 and 2 of the first volume of the *Turkische Zeitschrift für Hygiene und experimentelle Biologie.*

The volume opens with a Foreword by the Ministry of Hygiene and Social Assistance, after which there are a series of articles by the officers of the Institute describing the Departments of Bacteriology, Immunology, Pharmacology, and Social Hygiene. There are studies on milk, with special reference to Bang's disease and tuberculosis, tularemia, beriberi, tetanus antitoxin, immunization against diphtheria, typhoid fever, pneumonia, water purification, etc.

The first number gives photographs of prominent men and of the Institute. The interiors of the various departments show what are evidently complete and up-to-date laboratories.

There is only one article in the two numbers in English—a description of the School of Hygiene of the Turkish Ministry of Hygiene, by Dr. R. K. Collins, the Director. This School has Departments of Epidemiology and Statistics, Parasitology, Sanitary Engineering, Hygiene, Bacteriology and Serology, and Public Health Administration. A special feature is the instruction for medical officers of health in two courses annually. It is expected soon to hold institute courses for sanitary agents and nurses.

The volumes are largely in the Turkish language, though many of the descriptions are in German also. The workers and lecturers of the Institute have evidently traveled widely and studied at noted institutions the world over—one at the Rockefeller Institute in New York as well as the Claude Bernard Hospital in Paris.

We wish well for this Institute, which is under the Ministry for Hygiene of the Turkish Republic. We cannot but express a hope that the recent terrible earthquake has not interfered with its operation just at a time when its services must be especially needed. We welcome this new *Journal* and recognize, as the Foreword points out, its national and international interest.

BOOKS AND REPORTS

Health for New York City's Millions: An account of activities of the Department of Health of the City of New York for 1938—with comparative vital statistics tables—*By John L. Rice, M.D., Commissioner of Health. New York: Department of Health,* 1939. 295 pp.

The New York City Department of Health a year ago in its "Health for 7,500,000 People," presented its annual report in a new and striking format. It has followed this up by issuing the report for 1938 under the title "Health for New York City's Millions."

It is always an inspiration to be put in touch with the really remarkable achievements of the New York City Department of Health under the leadership of Dr. John L. Rice. Under the inspiration of Stephen Smith in the seventies and of Hermann Biggs between 1890 and 1915, the New York City Department of Health led the world, and now for a third time the department once more achieves preeminence. In addition to the excellent quality of all the routine activities, special mention should be made of the decentralized program of health center development, 5 new district buildings having been completed in the year 1938. Another unique feature of the New York Department is its remarkable program of staff education. It is encouraging to see the continued progress of fundamental research in regard to gonorrhea, to epidemic diarrhea of the new-born, to diphtheria immunization, trichinosis control, and public health nursing procedures.

This report contains solid factual and statistical material included in the ordinary health department report. It is unique, however, in the richness of its pictorial illustrations and in effective headlining; "Watching the dollars and cents" for budgetary data; "Figures that speak" for vital statistics; "Working and learning" for staff education; "Heirs of Pasteur" for the laboratory; "Public health G-men" for epidemiology; and "Shock troops of the department" for public health nursing. All this is to the good, but one wonders whether it might not be possible to make the appeal for public interest more effective by issuing the solid material which is of vital interest to the professional worker in one volume and preparing a second independent report of much briefer character, giving a well illustrated airplane view of what the work of the department during the year has meant to the ultimate consumer.

C.-E. A. WINSLOW

The Administration of Old Age Assistance—*By Robert T. Lansdale, Elizabeth Long, Agnes Leisy, Byron T. Hipple. Chicago: Public Administration Service,* 1939. 345 pp. Price, $3.75.

This volume is the product of one of a series of studies initiated by the Committee on Public Administration dealing with the administration of the Social Security program. An attempt has been made to discover the best practice achieved in the administration of old age assistance and to describe and analyze this experience. For this purpose, twelve states were studied.

The first section of the report deals with organization, general administration, and executive control. Considera-

tion is then given to the administration of social service activities including the direct relationships of the agency to the individual. Part Three is devoted to financial aspects of the program, including financing the program, budgeting disbursement of funds, accounting, and control by central or overhead agencies. Part Four includes chapters on personnel, activities, fair hearings and appeals, and the place of boards in the management of agencies. Those responsible for the planning and administering of state and local programs will find this a useful source of information.

IRA V. HISCOCK

Food Control: Its Public-Health Aspects—*By James Houston Shrader, Ph.D. New York: Wiley,* 1939. 513 pp. Price, $4.00.

This excellent manual on food control is designed mainly for the use of regulatory officers, food technologists, and students of the food industry. As one who has long been a teacher of this subject and also a practical administrator of official and industrial food control measures, the author not only is well qualified to present this much needed material, but has done so in a most acceptable manner.

After a preliminary discussion of the relation of food and food control to the public health, the author devotes most of his 20 chapters to the problems of specific foods, such as milk and other dairy products, meat and poultry, eggs, fish, cereals and bakery products, fruits and vegetables, and canned and preserved foods. In connection with each product he discusses technology, public health relations, and necessary control measures. Useful bibliographies are appended to each chapter, while vitamin units and the present Federal Food, Drug and Cosmetic Act are explained in two appendices. There is also a good index.

Since food poisoning cases and infections due to contaminated foods are, unfortunately, much too prevalent in this country, the facts marshalled in this well printed book will be most useful to public health and food officials, and also to food manufacturers, in their common endeavors to protect the health and welfare of all consumers. The book should, in fact, be in the library of every regulatory official and every purveyor of food, and should be frequently consulted.

JAMES A. TOBEY

Gonorrhea in the Male and Female—*By P. S. Pelouze, M.D. Philadelphia: Saunders,* 1939. 489 pp. Price, $6.00.

During the past 4 or 5 years more radical changes have occurred in our basic knowledge of gonococcus infections than in any other field of medical science with the possible exception of that having to do with pneumonia. There has been a tremendous increase in productive research and in medical and public interest. Our methods of diagnosis have been carefully reviewed and improved. Several new methods of treatment have been introduced. The public health program has been expanded not only with regard to syphilis but also gonorrhea and gonorrheal vaginitis. As a consequence, literature more than five years old is, to a large extent, out of date.

The first edition of Pelouze's book, published in 1928, dealt only with gonorrhea in the male, and caused a sensation. It was referred to as the most important contribution to the subject since the work of Finger 25 or 30 years ago. In answer to a demand from the medical profession, a second edition was soon issued dealing with gonorrhea in the male and female.

A third edition, *Gonorrhea in the Male and Female,* has appeared. To a large extent this is a new book. Such old chapters as have been retained have been largely rewritten and much new material has been added. The book is

divided into 3 parts, "Gonorrhea in the Male," "Gonorrhea in the Female," and "The Medical Profession and Gonorrhea Control."

The present edition includes discussion of fever therapy, sulphanilamide and its derivatives, and estrogenic substances in the treatment of gonococcus infections. Improved culture methods are discussed as well as other improved technics of diagnosis and test of cure. The third part is entirely new and will be especially interesting to public health workers, dealing with the medical, social, and economic problems involved in the application of modern knowledge to prevention and control of gonorrhea.

The author's style is most attractive. The book is copiously illustrated with photographs, drawings, charts, and graphs. Many of the illustrations are in colors.

This work should be included in the essential books of all who deal with gonococcus infections, either from the medical or from the public health point of view. This is especially desirable at present when plans are rapidly maturing for a major public health offensive against the most prevalent and heretofore the most neglected of all serious communicable disease.

WALTER CLARKE

Improvised Equipment in the Home Care of the Sick—*By Lyla M. Olson, R.N. (3rd ed.). Philadelphia: Saunders,* 1939. 264 pp., 419 ill. Price, $1.50.

The author says that in 1926 she was asked to give a demonstration on improvised equipment at an institute, but after several weeks of effort to collect improvised equipment she scarcely had enough material to cover a demonstration of 20 minutes.

At the Minnesota Nurses' Convention that same year she became convinced that the nurses were genuinely interested in improvising equipment for the home care of the sick but were hampered by lack of information on the subject. To fulfil this need she compiled her first edition.

This latest edition is a convenient size. It contains 419 illustrations of equipment with accurate directions on how to make it and how to use it. Each suggestion is practical and has been tested by the author. Most of the supplies required can be found in the average home of modest income.

Graduate and student nurses from modern hospitals are accustomed to using complicated and expensive equipment. This text will show them how to improvise equipment for their patients' comfort with the least expense to the families.

BERNICE CAIN

Handbook of Bacteriology: For Students and Practitioners of Medicine—*By Joseph W. Bigger, M.D. (5th ed.). Baltimore: Williams & Wilkins,* 1939. 466 pp. Price, $4.25.

This deservedly popular book has reached its 5th edition since 1925. Three of the former editions were reprinted and a Spanish edition was published in 1935. The book has been thoroughly revised and brought up to date, but careful elisions have been made so that the new edition contains only 12 more pages than the 4th. The marked changes made involve antiseptics, immunity, streptococci, food-poisoning and dysentery bacilli, undulant fever and tubercle bacilli, but the whole text has been revised.

The first edition promptly established its popularity which has been growing with each succeeding edition. We know of no book, regardless of size, which is more useful for the average undergraduate student.

The printing and make-up are excellent and the illustrations sufficient in number as well as good. The reviewer has been told that this is the most popular textbook on the subject in Eng-

land and in Canada, and we can well believe it. The book can be heartily recommended. MAZŸCK P. RAVENEL

Laboratory Manual for General Bacteriology—*Compiled by Carl E. Georgi, Lawrence F. Lindgren, and George L. Peltier (2nd ed.). New York: Wiley,* 1939. 279 pp. (paper, spiral binding). Price, $2.00.

This manual is very plainly intended for class use and probably represents quite closely the plan followed in the courses taught by its authors at the University of Nebraska. To make it more useful in the laboratory, every exercise begins on a right-hand page and is followed by a blank sheet of paper before the next begins. This sometimes leaves three blank pages between exercises so that the number of printed pages in the book is very much less than indicated by the total paging. This use of blank pages allows much room for student notes but makes it a little difficult in thumbing through the book to find the exact page for which one is looking. This is a minor point, and in more important respects the book does not seem to be open to criticism. H. J. CONN

The Health Insurance Doctor: His Rôle in Great Britain, Denmark, and France—*By Barbara N. Armstrong. Princeton, N. J.: Princeton University Press,* 1939. 264 pp. Price, $3.00.

This study, approached on a " foundation of twenty years of research and university teaching in the social insurance field," embodies an investigation of several months in the three countries, selected because " they are democratic countries and their experience is of special interest in America." A brief outline of the health insurance scheme is given before the discussion of the health insurance doctor in each of the countries discussed. Students of health insurance may find relatively little new material, although an interesting picture is given of the effects on the individual doctor and to some extent on the public and on government. However, basic information is given on the physician's position, based on first-hand investigation of what has been done to uphold the private practice and " free choice of professional services " precept. The critical approach brings out achievements and weaknesses. The author concludes that health insurance, by throwing a spotlight on the extent of illness, its neglect, and its enormous cost, is promoting the cause of preventive medicine in all fields, and states: " That this cause must become the concern of the individual practitioner, if the traditional doctor-patient relationship is to survive, is a growing conviction of the leaders in organized medical circles in France, as in Britain and Denmark."

The book is well printed.

IRA V. HISCOCK

Handbook of Public Health Bacteriology and Chemistry: General information regarding epidemiology, collection and shipment of specimens, and bacteriologic, serologic and chemical procedures—*Department of Public Health of San Francisco. (2nd ed.) San Francisco: J. W. Stacey, Inc.,* 1939. 150 pp. Price, $1.50.

The first edition of this *Handbook* appeared in 1937 and was favorably received. The second edition has been revised and a few changes have been made. The section in the first edition on epidemiology has been omitted, though this feature is considered in connection with each disease. The Preface points out several basic errors in the use of laboratory service and urges the proper collection of specimens, and warns against routine work, holding that each specimen submitted should

constitute a sort of puzzle for the laboratory worker and more carefully studied than is implied in the word "routine."

This little *Handbook* can be thoroughly recommended. The printing and make-up are excellent. It has ring binding and is of a size easily carried in the coat pocket.

MAZŸCK P. RAVENEL

Liquor, Servant of Man—*By Walton Hall Smith and Ferdinand C. Helwig, M.D. Boston: Little Brown,* 1939. 273 pp. Price, $2.00.

This book as a presentation of the benefits of alcohol will undoubtedly attract considerable attention and stir up much bitter controversy. The authors apparently delight in startling the reader and enjoy exposing the fallacies of many of the popular beliefs about alcohol. Most of the material is in accord with the present views of science. However, the manner of presentation is such as to give the impression of propaganda. At times the material is so presented as to cause the average reader to develop a false optimism concerning the problem of alcoholism and to minimize its importance.

It may surprise many readers to learn that the best scientific evidence available indicates that alcohol does not cause arteriosclerosis, that alcohol has a definite food value, that it does not cause feeblemindedness and insanity in the offspring of those who indulge to excess, and that alcohol is valuable in the treatment of certain diseases such as diabetes, heart disease, and many conditions occurring in elderly persons. The authors present these and many other points in a satisfactroy manner. However, not content with this, they go on to present as established facts certain points which are debatable. For example: "Alcohol does not cause delirium tremens or any of the diseases mentioned; all of them result from deficiency in diet." It is quite probable, but not fully proved that dietary deficiency plays an important rôle in the production of delirium tremens; however, if the dietary deficiency is caused by the fact that alcohol has so upset the patient's stomach that he cannot retain food, alcohol would still be the original cause of the condition.

The authors also insist that alcohol depresses the sex activity of the individual. Alcohol, of course, is a narcotic and not a stimulant, but when a narcotic affects the higher inhibitory centers as alcohol does, the first reaction from moderate doses may be the same as if one gave a stimulant. There seems to have been no clear distinction made between the ideas that small doses of alcohol by releasing inhibition may produce an increase of sex activity, and the equally correct idea that large doses of alcohol produce temporary impotence. It is unfortunate, therefore, that the authors have allowed a few such statements to be included in the book, since they are definitely one-sided and give a false impression. This may lead those who do not wish to see the real facts concerning alcohol presented and accepted, to attack the validity of the other statements in the book which rest on established work, and may prevent the acceptance of some of the material which is clearly proved. One has no objection to the authors' showing the absurdity of some of the common beliefs about alcohol, but it would be better if they had leaned backward a little in their statements on controversial matters.

KARL M. BOWMAN

Love Problems of Adolescence—*By Oliver M. Butterfield, Ph.D. New York: Emerson Books,* 1939. 212 pp. Price, $2.25.

"Adolescent love," says Professor Leta Hollingworth, "continues to be one of the most powerful motives of adolescent conduct with which parents and teachers must reckon." From this

declaration the author, who is an experienced consultant in this field, develops an analysis of adolescent conduct, based on extensive records of interviews and group study.

Describing boy and girl friendship, the problems of keeping "steady company," the complications of the engagement period, and the conflicts of the premarital period, this volume develops a most wholesome approach which should help many a physician, nurse, or parent to adjust his mature information to the needs of the boy and girl. The author's conclusions are illuminating and not at all dogmatic. They are well documented with the newer literature.

"So long as a large number of parents do practically nothing to assist their children to understand and manage this aspect of life there would seem to be a place in every school, church, or young people's society for some confessor-counselor to whom young people might freely go for answers to their perplexities without fear of punishment or publicity. The questions of these young people reveal something of the way in which many parents and workers with young people apparently are handicapped socially and mentally by ignorance of the elementary facts of human sex life. These ignorance-mysteries are as annoying as a chapter that is missing in the most interesting portion of a good book. They leave young people confused and uncertain as to the meanings of the rest of life."

The book deserves wide reading.

REGINALD M. ATWATER

The Sanitary Inspector's Handbook—*By Henry H. Clay, with an Introduction by Sir W. Wilson Jameson, M.D. (4th ed.) London: H. K. Lewis & Co. Ltd.,* 1939. 528 pp. Price, $5.25.

First published in May, 1933, this book has now reached its 4th edition. The demand for this edition came just when the Food and Drug Acts of 1938 went into operation, and the author has taken advantage of it to rewrite the chapters dealing with food and food premises. The changes have made it necessary to add about 30 pages.

The book is designed for sanitary inspectors and other public health officers in England, and its practical value for Americans is limited by that fact. However, one can always learn by seeing what others are doing. The author is a recognized authority, and this last edition has kept up the standards set in the first. It can be recommended unreservedly as a practical guide and reference for officials as well as a manual for students.

The binding and make-up of the book are excellent, and the 97 illustrations well chosen. MAZŸCK P. RAVENEL

Sports for the Handicapped—*By George T. Stafford. New York: Prentice-Hall,* 1939. 302 pp. Price: trade, $2.75; text, $2.00.

This is a well written book, in textbook form, dealing with all the aspects of the problem. The bibliography is large, and well selected. Each chapter closes with questions for developing a knowledge of the subject.

The first section is a historical review of the development of correct physical education and the outgrowths of the various associated fields, such as occupational therapy, and recreational therapy.

It has been shown that while there is great need for these particular branches, there is also need for the outlets found in normal sports of the group activities and competition. However, these must be so adapted as not to interfere with the corrective program in any way, and should be adapted so as to help the condition.

A thorough study has been made of the defects that are found among students in secondary schools and colleges

throughout the country, and a description is given of the effects of physical defects on the personality. The technic of adapting sports to the handicapped is described and so simplified as to make it comparatively easy for such groups to be organized.

The last four chapters tell of the treatment of the various types of defect. These are grouped so that specific types of sports can be adapted satisfactorily.

The book covers the subject thoroughly and fills a definite need in connection with those working with handicapped individuals of all types.

WINTHROP M. PHELPS

202 Common Household Pests of North America—*By Dr. Hugo Hartnack. Chicago: Hartnack Publishing Co.*, 1939. 319 pp. Price, $3.75.

In the foreword and reference to literature the author shows familiarity with German literature, on which he has drawn freely. He indicates less familiarity with other foreign and also American works, adding that the subject is treated more or less cursorily in the United States, though he has also drawn extensively on American literature. The author's style of presentation is variable and at times intriguing. His insistence that pest prevention is cheaper and better than pest control is in line with sound teaching in preventive medicine. He has followed German workers on insect classification and some of his arrangement is, therefore, not in line with that of American authorities. The illustrations, including comic cartoons, are numerous and in most cases good. They have been drawn from various sources mostly without the usual acknowledgment.

The author first takes up the rat and mouse problem, stressing their importance as carriers of diseases. The control measures are presented in a clear, systematic manner with emphasis on prevention.

Sparrows, pigeons, and squirrels are also dealt with briefly, but most of the text is devoted to the insects and a few of their close allies—spiders, ticks, mites, sowbugs, and centipedes.

Among the various insect pests, special attention is paid to such pests as the silverfish, crickets, cockroaches, termites, book lice, cereal beetles and moths, dermestids, powder post beetles, tobacco beetles and related forms, bean, pea and grain weevils, ants, clothes moths, flies, mosquitoes, fleas, bedbugs, boxelder bugs, mites, ticks, spiders, sowbugs, centipedes, and others. Less space might have been devoted to a number of these pests which are really of little importance in the home, while more space should have been devoted to the more important ones. More might well have been said about the importance of such disease carriers as mosquitoes, flies, fleas, mites, and ticks, and more space given to a fuller discussion of their prevention and control. Nothing is said about lice, which often become serious household pests.

The book should prove most useful to the members of the pest control industry, for whom it seems to have been especially written since the author has devoted several pages to the problems of the pest exterminator.

LEONARD D. HASEMAN

A Textbook of Microbiology—*By Kenneth L. Burdon, Ph.B., Sc.M., Ph.D. (2d ed. of A Textbook of Bacteriology). New York: Macmillan*, 1939. 638 pp., 103 ill. Price, $2.75.

This book covers microbiology in fact as well as in name. The text includes a consideration of protozoa, fungi, the mold-like higher bacteria, spirochetes, rickettsiae, and filtrable viruses as well as the true bacteria.

The style is clear, and fundamentals are stressed. It should prove a satisfactory text for the group for which it is written—nurses in training and col-

lege students. More than usual attention is given to interests relating to public health and preventive medicine.

Part 1 (146 pages) is devoted to historical aspects and to a consideration of fundamentals of general microbiology. Numerous drawings, diagrams, and photographs are used to good effect. Part 2 (56 pages), with 3 appendices, is concerned with the laboratory study of microörganisms. There is sometimes too much detail, if the purpose is to define fundamental procedures; and the descriptions of methods are generally too brief if the intent is to give technical directions for students to follow. One of the good available laboratory manuals or a laboratory syllabus would eliminate the necessity for much of the material in this section. Part 3 (80 pages) presents simply and clearly a consideration of the methods of spread of communicable disease, and of sources and modes of infection. This is good epidemiology for the nurse or non-medical reader. Part 4 (70 pages) gives a concise elementary presentation of infection and resistance. Part 5 (220 pages) is devoted to the microbiology of important communicable disease.

Appendix E includes a group of well selected general references. There is no bibliography of original sources. The index is adequate. J. E. GORDON

Brucellosis in Man and Animals—*By I. Forest Huddleson, D.V.M., A.V. Hardy, M.D., J. E. Debono, M.D., and Ward Giltner, D.V.M. New York: Commonwealth Fund,* 1939. 339 pp. Price, $3.50.

The name of Huddleson as senior author of a book on brucellosis is enough to show that it is important and authoritative. In the present volume he has had three contributing authors: Hardy on the Distribution of Brucellosis in Human Beings in the United States, Debono on Brucellosis in Malta, and Giltner on the Control of Brucellosis in Animals. On the flyleaf is a statement which will perhaps be a surprise to many readers:

" Mediterranean (undulant) fever is in the course of evolution, and is tending to become chronic. It is a malady which, on account of its manifestation and chronicity, will become one of the most common and stubbornest diseases. . . . Mediterranean fever is a disease of the future."—*Charles Nicolle*

Not many years ago, when many of us were students, Malta or Mediterranean fever was one of the things about which we read but of which we had little conception, and certainly no intimation that the causative germ was one of a widely distributed group which was with us in this country.

The germ of Malta fever, which was a major cause of disability among the naval and military forces in Malta, was discovered by Bruce in 1887, and named by him *Micrococcus melitensis.* In 1905 it was demonstrated by Zammit, of the British Commission, that the milch goats of Malta were the carriers of the germ. Then came the discovery by Bang in 1897 of the *Bacillus abortus* which excited interest largely on account of its economic importance.

There has existed an unfortunate confusion over the classification and nomenclature of the organisms, now definitely placed in the genus Brucella, in honor of Colonel David Bruce, who isolated the first species. A like confusion has existed in the names applied to the diseases of which it is the cause. The generally used term for the disease in human beings is " undulant fever," introduced by Hughes in 1897.

The first authentic case of brucellosis originating in the United States was reported by Craig in 1905, and during the same year the disease was imported into this country in a shipment of goats from Malta. In 1911 the first epidemic occurrence of the disease was observed in the Pecos Valley

of Texas due to imported goats. Traum isolated the *Brucella suis* in 1914, and since that time knowledge of what have come to be recognized as related groups of pathogenic bacteria has increased with bewildering rapidity. In 1918 Evans showed that the *Bacillus abortus* and the *Micrococcus melitensis* were practically the same.

An enormous amount of work has been done in this country and it is now known that there is no broad area known to be free of Brucella infection in animals and in man. While there is at present an extensive literature—running to 378 references in this volume—it is not too much to say that to Huddleson personally and to those working under him, we owe not only the sustained interest of brucellosis in this country, but most of the outstanding facts. For more than half the time which has elapsed between the appearance of the work of Hughes, who some 40 years ago published his *Undulant Fever*, Huddleson has devoted practically his entire time to the study of the Brucella in person as well as in the direction of the work of others and indirectly through consultations and correspondence. The first important publication in the United States was his book, *Brucella Infections in Man and Animals*, which was a treatise on laboratory diagnosis. The present volume replaces that publication, though it still covers the subject in up-to-date form, but also goes into the general clinical aspects of the disease, distribution in this country, symptomatology, diagnosis, pathology, and treatment. The various tests are treated of fully, including the Brucellergen test. In connection with this we note that of 1,122 male students at Duke University with no clinical history of infection, tested with "Brucellergen," 127, or 11.3 per cent, gave a positive reaction, an indication of the prevalence of a present or past infection.

The last section of the book is on the eradication and control of Brucellosis in animals, on which the control of the disease in man depends. An Appendix of 31 pages is devoted to case reports made in Iowa.

It may be said without hesitation that the volume contains a clear and succinct statement of our knowledge of the disease. The senior author recognizes that it is not the last word on the subject but is an attempt to offer in usable form the latest knowledge in Brucella infection. The book is well printed and well illustrated.

NOTE: There is an unfortunate error in the first paragraph of the first page concerning the isolation of the organism. The Commonwealth Fund has taken steps to correct this in the copies already distributed, but as a number have gone to foreign countries, it seems wise to call attention to it in this review.

MAZŸCK P. RAVENEL

Nutrition and Diet in Health and Disease—*By James S. McLester, M.D. (3rd ed.). Philadelphia: Saunders,* 1939. 838 pp. Price, $8.00.

The third edition of this standard work is a noteworthy contribution to the literature on food and nutrition. While following the general plan of the earlier editions, the text has been almost completely rewritten in the light of the newest developments in the rapidly expanding science of human nutrition. New chapters on infant feeding and feeding of surgical patients have been contributed by Drs. P. C. Jeans and Dean Lewis, respectively.

The book is divided into two parts, the first dealing with nutrition in health, and the second with nutrition in disease. In the former there are full descriptions of factors affecting the utilization of food, of various food products, and of the known principles of diet; while the second part discusses prevention of food deficiency states and the use of diet in the treatment of numerous diseases and physical disorders. A number of useful

appendices give special methods of feeding, methods of cooking, food analyses, vitamin and mineral contents of foods, and other valuable data. The book is well documented, has a good index, and is excellently printed.

Physicians and public health officials who are interested in nutrition as a potent factor in health, and who should be thoroughly familiar with the subject but seldom are, will find this book most valuable.

JAMES A. TOBEY

BOOKS RECEIVED

STANDARD METHODS OF THE DIVISION OF LABORATORIES AND RESEARCH OF THE NEW YORK STATE DEPARTMENT OF HEALTH. Augustus B. Wadsworth, M.D., Director. 2d ed. Baltimore: Williams & Wilkins, 1939. 681 pp. Price, $7.50.

VIRUS AND RICKETTSIAL DISEASES. With Special Consideration of Their Public Health Significance. Harvard School of Public Health Symposium Volume. Cambridge: Harvard University Press, 1940. 907 pp. Price, $6.50.

RADIO MANUAL. Prepared by the Oral Hygiene Committee of Greater New York, Publishers, 1939. 202 pp. Price, $1.50.

A HISTORY OF CONTAGIOUS DISEASE CARE IN CHICAGO BEFORE THE GREAT FIRE. By Constance Bell Webb. Chicago: University of Chicago Press, 1940. 169 pp. Price, $1.25.

THE PATIENT'S DILEMMA. By Hugh Cabot. New York: Reynal & Hitchcock, 1940. 284 pp. Price, $2.50.

MUNICIPAL ADMINISTRATION. By John M. Pfiffner. New York: Ronald Press, 1940. 582 pp. Price, $4.00.

CHILD PSYCHOLOGY FOR PROFESSIONAL WORKERS. By Florence M. Teagarden. New York: Prentice-Hall, 1940. 641 pp. Price, $3.25.

DIETARY OF HEALTH AND DISEASE. By Gertrude I. Thomas. 3d ed. Philadelphia: Lea & Febiger, 1940. 317 pp. Price, $3.50.

APPLIED MICROBIOLOGY AND IMMUNOLOGY FOR NURSES. By Charles F. Bolduan and Nils W. Bolduan. 8th ed. Philadelphia: Saunders, 1940. 280 pp. Price, $2.25.

FLEAS OF EASTERN UNITED STATES. By Irving Fox. Ames: Iowa State College Press. 191 pp. Price, $3.00.

MIGRATION AND SOCIAL WELFARE. By Philip E. Ryan. New York: Russell Sage, 1940. 114 pp. Price, $.50.

NEW HOMES FOR OLD. Public Housing in Europe and America. By William V. Reed and Elizabeth Ogg. New York: Foreign Policy Association, 1940. 112 pp. Price, $.25.

PROCEEDINGS THIRD ANNUAL SYMPOSIUM, NORTHWESTERN UNIVERSITY MEDICAL SCHOOL, DEPARTMENT OF INDUSTRIAL MEDICINE. Chicago: Northwestern University Medical School, 1939. 125 pp. Price, $2.00.

ANNOTATED BIBLIOGRAPHY ON INCINERATION, CARBONIZATION AND REDUCTION OF GARBAGE, RUBBISH AND SEWAGE SLUDGE. U. S. Works Progress Administration. New York: New York University, 1939. 146 pp.

ON PRESENT POSSIBILITIES OF INCREASING THE HIGHER FUNCTIONS OF THE CORTEX THROUGH ARTIFICIAL CHANGES IN ITS ARCHITECTONIC. By Stephen Zamenhof. Lancaster: Science Press, 1940. 28 pp.

THE FOUNTAIN OPERATOR'S MANUAL. For Chain Drug, Variety and Independent Store Soda Fountain Operators. New York. Fountain Operator's Manual, 1940. 160 pp. Price, $3.00.

REFUSE MATERIALS. Bulletin No. 8. Chicago: American Public Works Assn., 1940. 44 pp. Price, $.50.

THE MEDICAL CAREER. By Harvey Cushing. Boston: Little-Brown, 1940. 302 pp. Price, $2.50.

RURAL HEALTH WORK IN HUNGARY. By Dr. B. Johan. Budapest: State Hygienic Institute of Hungary, 1939. 230 pp.

THE SPECIFIC THERAPY OF THE PNEUMONIAS (Beaumont Foundation Lecture for 1939). By Jesse G. M. Bullowa. Reprint from *The Journal of the Michigan State Medical Society* [4421 Woodward Street, Detroit, Mich.], July–August, 1939. 80 pp.

A SELECTED PUBLIC HEALTH BIBLIOGRAPHY WITH ANNOTATIONS

RAYMOND S. PATTERSON, PH.D.

And the Nation's Health—Provisional analyses of case reports portend better 1939 statistics. Diphtheria cases were fewer by about 5,500. Encouraging records were made by meningitis, scarlet fever, smallpox, typhoid fever, and whooping cough. Measles was less than half the incidence of 1938. Poliomyelitis was decidedly higher. Toward the close of the year influenza showed an appreciable increase each week. It will bear watching.

ANON. Health of the Nation. Pub. Health Rep. 54, 52:2269 (Dec. 29), 1939.

What Three Million Dollars Did—Briefly reporting upon the marked increase in venereal disease control and treatment activities for the 1939 fiscal year. Coöperating clinics increased by 85 per cent; new cases by 60 per cent over the previous year; other statistics astronomical in size.

ANON. Progress in Venereal Disease Control During Fiscal Year 1939. V. D. Inform. 20, 12:376 (Dec.), 1939.

Our Deadly and Glorious Fourth—Adequate state legislation will effectively reduce fireworks injuries. The evidence is so unmistakable that there is no longer any excuse for failure to adopt well tried laws. Last fourth, the total reported serious injuries were 5,600—somewhat less than the previous year, but sufficient proof of the existing laxness in many states.

ANON. Third Annual Summary of Fourth of July Injuries. J.A.M.A. 114, 1:39 (Jan. 6), 1940.

Health Workers and Teachers—In a coöperative venture of one state's health and education departments, the teachers are made to feel responsibility for the children's health; they are helped but not relieved of this burden by nurses and health officers.

BAGLEY, B. B. How Can the State Department Help School Health Procedures (no question mark). J. School Health. 10, 1:12 (Jan.), 1940.

Tuberculosis in Hospital Workers—Much has been written about the occupational hazard of hospital personnel exposed to tuberculous patients. This study based upon routine roentgenograms leads to the conclusion that the danger has been overestimated, for here it is found that occupational exposure does not increase tuberculosis morbidity or mortality except to tuberculin negative student nurses.

BRAHDY, L. Tuberculosis in Hospital Personnel. J.A.M.A. 114, 2:102 (Jan. 13), 1940.

Children of Tuberculous Households—In this study of tuberculosis in white and colored families in which there existed a case of tuberculosis, it was found that the risk of infection of children is greatly increased and about equal in both races, but the risk of mortality from tuberculosis is much greater in colored children.

BRAILEY, M. A Study of Tuberculosis Infection and Mortality in the Children of Tuberculous Households. Am. J. Hyg. 31, 1:1 (Jan.), 1940.

Trichinosis and Trichina Infestation—Although only 5,000 or 6,000 cases of trichinosis have been reported in the last 95 years, routine autopsies indicate that about 18 per cent of all adults acquire some infestation with trichinae. Methods under way to reduce the infestation in swine are discussed. In the meantime, health educators have a job to induce people to cook pork adequately.

COMMITTEE REPORT. Trichinosis and Non-clinical Infections with Trichinella Spiralis. J.A.M.A. 114, 1:35 (Jan. 6), 1940.

Protection against Typhus—Vaccine grown on chick embryos was found to protect experimental animals against European typhus better than the appropriate vaccine does against our endemic typhus hereabouts. Let's hope we shall not soon have need to make practical use of this new found information against European grown lice.

COX, H. R., and BELL, E. J. Epidemic and Endemic Typhus: Protective Value for Guinea Pigs of Vaccines Prepared from Infected Tissues of the Developing Chick Embryo. Pub. Health Rep. 55, 3:110 (Jan. 19), 1940.

Lo, the Poor Farmer—From city studies we have come to believe that health and economic status are related. This survey discovers that the same phenomenon holds true in rural areas. One good and one poor agricultural county were compared and it was found that differences were greatest in the diseases against which modern medicine and sanitation are most effective. Well, that's that!

DORN, H. F. Mortality Rates and Economic Status in Rural Areas. Pub. Health Rep. 55, 1:3 (Jan. 5), 1940.

Illness Survey—In this preliminary report of a sampling of a white population of a city district you will find much of interest. Migrant families suffer higher illness rates than non-moving ones. Rheumatism, rheumatic fever, and rheumatic heart diseases are unexpectedly high among the chronic conditions. This should prove a most useful survey.

DOWNES, J., and COLLINS, S. D. A Study of Illness among Families in the Eastern Health District of Baltimore. Milbank Quart. 18, 1:5 (Jan.), 1940.

Fundamentals in Tuberculosis Control—Searching for tuberculosis has shifted from the grade school child to young adults. Mortality curves now show more nearly a continuous upward movement instead of the exaggerated 20–30 year peak characteristic of the first decade of the century. The maximum risk of infection is during early adult life. Control depends upon adequate isolation of open cases, adequate care of all cases, vigorous effort to find cases early, special attention to those most imminently endangered.

DOWNES, J. Salient Points of Attack against Tuberculosis. Milbank Quart. 18, 1:44 (Jan.), 1940.

Sewage, Swimming, and Polio—Consider these statements: poliomyelitis occurs usually in summer; it may be spread by some agency other than contact; epidemics are frequent in communities on the sea coast or along sewage polluted streams; virus can be recovered from fecal matter; unrecognized cases may be carriers; infection commonly enters through olfactory nerves; water inevitably gets into the nose of bathers. It would seem that sewage polluted bathing places might be a source for the spread of poliomyelitis.

ELLSWORTH, S. M. Can Infantile Paralysis Be Spread by Bathing in Sewage Polluted Waters. New Eng. J. Med. 222, 2:55 (Jan. 11), 1940.

Health for Farm Families—How prepaid medical care programs for farm families receiving federal aid were worked out with the state medical socie-

ties concerned is told in interesting detail. That they are continuing seems to indicate their need and practicability. We note here, and mourn, the passing of "The Health Officer," it served a real use, and should have enjoyed a longer life.

HAMPTON, B. C. The Medical Care Program for Farm Security Administration Borrowers. Health Officer. 4, 8:287 (Dec.), 1939.

Causes of the Decline in Rheumatic Fever—Most deaths attributed to heart disease in the 5–24 year age group are due to rheumatic heart disease and there has been a substantial reduction in such deaths especially during the past decade. The speculation about the possible causes for the decline forms about the most stimulating discussion-of-the-month. It should not be spoiled by an attempt to epitomize it here.

HEDLEY, O. F. Trends, Geographical and Racial Distribution of Mortality from Heart Disease among Persons 5–24 Years of Age in the United States During Recent Years (1922–1936). Pub. Health Rep. 54, 52:2269 (Dec. 29), 1939.

"It Takes Two to Make a Diabetic"—Diabetes is a public health problem even though it is a hereditary disease. If both parents have diabetes one may expect that the children who grow to middle age will have it. It follows the usual mendelian principles, and hereditary taint exists in every fourth person in America. Obesity is the outstanding precursor, so mature relatives of diabetics should stay thin. Experimentally, the injection of pituitary extract can cause diabetes. Perhaps some day an anti-diabetic principle will be found.

JOSLIN, E. P. Diabetes—A Public Health Problem. Pub. Health Nurs. 32, 1:3 (Jan.), 1940.

Caries Runs in Families—From the dental records of elementary school children, groups of children showing high and low incidences of caries were selected. Then the records of the brothers and sisters of the "sheep and goats" were obtained. It was found that the brothers and sisters of the susceptibles had more than twice as much caries of both permanent and deciduous teeth as had the brothers and sisters of the immune children. This is certainly a morsel over which one may ruminate indefinitely

KLEIN, H., and PALMER, C. E. Dental Caries in Brothers and Sisters of Immune and Susceptible Children. Milbank Quart. 18, 1:67 (Jan.), 1940.

Anent Thumb Sucking—Thumb sucking in babies occurs when they are hungry, there is little need for treatment and restraints are unwise. In 2 to 5 year children, the habit results from boredom, frustration, punishment. Treatment should be directed toward removing or ameliorating the cause; a direct attack on the symptom is of little use. Health workers should reassure parents about the harmlessness of the habit and counteract the broadcast misinformation of the alarmists.

LANGFORD, W. S. Thumb and Finger Sucking in Childhood. *Am. J. Dis. Child.* 58, 6:1290 (Dec.), 1939.

Some Last Words on Pneumonia—This whole health bulletin is given over to the subject of pneumonia, its laboratory diagnosis, and treatment with both sulfapyradine and immune sera. Related papers on nursing care, and the disease in infants are also included. Altogether it forms an excellent review of this extensive subject by an experienced group of authors.

LORD, F. T. Important Considerations in Serum Treatment of Pneumococcus Pneumonia (and ten related papers). Commonhealth (Massachusetts Dept. of Public Health). 26, 4:224 (Oct.–Dec.), 1939.

Diet and Toxicology—An apple a day keeps the lead away. Experimental animals (rabbits) fed apples showed no

signs of toxicity, and survived when fed lead in amounts sufficient to poison the control animals that had no apples. This information is passed along in this bibliography to encourage you to eat apples and forget the possible spray materials on them, although the authors offer no such suggestions.

MANVILLE, I. A., *et al.* Studies on the Detoxication Mechanism. 1. The Ability of the Apple or Its Constituents to Counteract the Toxic Effects of Lead and Arsenic. J. Indust. Hyg. & Toxicol. 22, 1:36 (Jan.), 1940.

Sex Education in Schools—Our Surgeon General puts it up to the schools to coöperate with parents and physicians in giving our youth a safe sex educational background to carry them over into adulthood.

PARRAN, T. Sex Education—A Challenge. J. Nat. Education Assoc. 29, 1:16 (Jan.), 1940.

Health Movies—Listed are 140 educational motion picture titles on the subjects of health and safety—good, bad, and indifferent—some recent, some almost old enough to vote. It is interesting in itself to note that this large number is available. It would be even more illuminating to know how many are good.

PRITCHARD, E. G. Motion Picture Films for Health and Safety Education. Health Officer. 4, 8:300 (Dec.), 1939.

Against Needless Tonsil Slaughter—Too many teeth are extracted and too many tonsils are extirpated, say these authors, on the unjustified assumption that they are foci for infections causing rheumatoid arthritis and other systemic diseases. "Belief in focal infection," the authors quote, "must be taken like religion, on faith," for most of the so-called evidence is too shaky to stand up. They suggest less faith.

REIMANN, H. A., and HAVENS, W. P. Focal Infection and Systemic Disease: A Critical Appraisal. J.A.M.A. 114, 1:1 (Jan. 6), 1940.

Health Frontiers—Here you will find deftly presented stories of research in three health fields: the attack on jungle yellow fever by the vaccination of 1½ million South Americans; the large-scale project to stop malaria carried to menacing proportions by an African anopheline mosquito brought by boat (?) to South America; and, in contrast, recent laboratory research with epidemic influenza. Exhibit A on how to give a scientific talk.

SAWYER, W. A. Three Frontiers in Public Health. Pub. Health Nurs. 32, 1:21 (Jan.), 1940.

ASSOCIATION NEWS

SIXTY-NINTH ANNUAL MEETING

DETROIT, MICH., OCTOBER 8–11, 1940

HEADQUARTERS

Book-Cadillac Hotel and Hotel Statler

APPLICANTS FOR MEMBERSHIP

The following individuals have applied for membership in the Association. They have requested affiliation with the sections indicated.

Health Officers Section

Ricardo Archila, M.D., 1047 North Broadway, Baltimore, Md., Health Officer, Health Unit of Ciudad, Bolivar

Walter C. Humbert, M.D., 415 S. Main St., Erwin, Tenn., Unicoi County Health Officer

J. Edward Dehne, M.D., Coquille, Ore., Coos County Health Officer

John C. Dement, M.D., 302 State Bldg., San Francisco, Calif., Medical Officer, Bureau of Venereal Diseases, State Dept. of Public Health

E. M. Edwards, 1715 2nd Ave., Bessemer, Ala., Director, Bessemer Unit, Jefferson County Board of Health

Leroy L. Fatherree, M.D., M.P.H., City Hall, Little Rock, Ark., City Health Officer

Milton Goldman, M.D., 1950 Oakmont Drive, Glendale, Calif., Medical Officer, State Dept. of Public Health

Lewis H. Hoyle, M.D., C.P.H., Otero County Health Dept., La Junta, Colo., Director

Richard J. Humel, M.D., 5601 Cermak Road, Cicero, Ill., Medical Director, J. S. Morton Township High School

Porfirio Irazabal, M.D., 1030 North Broadway, Baltimore, Md., Health Officer, Caripilo, Venezuela

Lorin E. Kerr, Jr., M.D., 317½ West Elm St., Mason, Mich., Assistant Director, Ingham County Health Dept.

John T. Millington, M.D., 329 South 42nd St., Philadelphia, Pa., Student, University of Pennsylvania

Orville B. Moon, M.D., P. O. Box 342, Bisbee, Ariz., Cochise County Superintendent of Health

Daniel V. Morga, M.D., Sagay, Occidental Negros, Philippines, President, 3rd Sanitary Division, 37th Health District, Bureau of Health

James O. Nall, M.D., Louisa, Ky., Lawrence County Health Officer

Sumner H. Remick, M.D., 735 Trapelo Road, Waltham, Mass., Superintendent, Middlesex County Sanatorium

Harold A. Robinson, M.D., 103 Court St., Elyria, Ohio, Health Commissioner, Elyria Health District

Virgil D. Selleck, M.D., C.P.H., 59 Ridge St., Glens Falls, N. Y., Health Officer

Thomas C. Taylor, M.D., Physicians Bldg., Fort Collins, Colo., Health Officer

James A. Thrash, M.D., Columbus, Ga., Muscogee County Health Officer

Oliver E. Turner, M.D., M.P.H., 71 East Stratford Ave., Lansdowne, Pa., Student, University of Pennsylvania

C. Stewart Wallace, M.D., 321 Columbia St., Ithaca, N. Y., Health Officer

Laboratory Section

Victor E. Graham, Ph.D., Univ. of Saskatchewan, Saskatoon, Sask., Can., Assistant Professor of Dairying and Lecturer in Bacteriology

Donald J. Hahn, B.A., Division of Laboratories, 412 E. 5th St., Austin, Tex., Bacteriologist, State Health Dept.

William V. Halversen, Ph.D., Dept. of Bacteriology, Univ. of Idaho, Moscow, Ida., Head, Bacteriology Dept.

Marcia Hill, 1151 West Porphyry St., Butte, Mont., Member, Public Health Laboratory

Herman C. Lichstein, A.B., 506 East Catherine St., Ann Arbor, Mich., Student, Univ. of Michigan

Henri P. Minette, B.S., Box 209, Flagstaff,

Ariz., Bacteriologist, State Board of Health Laboratory

Martin J. Prucha, Ph.D., Univ. of Illinois, Urbana, Ill., Professor of Dairy Bacteriology, College of Agriculture

Beatrice T. Prushan, A.B., 1947 Gates St., Los Angeles, Calif., Bacteriologist II, Health Dept.

Wallace W. Sanderson, B.S., Fillmore Farms, Inc., Bennington, Vt., Chemist and Bacteriologist

Stanly D. Sattler, M.S., 314 West Harris Ave., Charlotte, Mich., Bacteriologist, Michigan Dept. of Health

Dorothy H. Shugart, A.B., 609 Charles St., Wellsburg, W. Va., Director, Brooke Serological Laboratory

Sarah Splaver, B.A., 879 Kelly St., Bronx, N. Y., Laboratory Assistant, Dept. of Physiology, Health & Hygiene, Hunter College

William R. Thompson, Ph.D., 27 Oakwood St., Albany, N. Y., Senior Biochemist, Division of Laboratories and Research, State Dept. of Health

Kenneth M. Wheeler, Ph.D., 1179 Main St., Hartford, Conn., Research Microbiologist, State Dept. of Health

Vital Statistics Section

William D. Carroll, B.B.A., C.P.H., State Dept. of Health, Land Office Bldg., Austin, Tex., Assistant State Registrar

Mariano M. Herbosa, M.D., M.P.H., School of Hygiene and Public Health, 615 N. Wolfe St., Baltimore, Md., Faculty Member, Institute of Hygiene, University of the Philippines

Engineering Section

Charles M. Davidson, B.S., 441 University Ave., Louisville, Ky., Sanitary Engineer, Dept. of Public Health

John E. Floyd, 164 Pennsylvania Ave., Asheville, N. C., Chief District Sanitarian, Western District, State Board of Health

Emil C. Jensen, M.S., Health Dept., City Hall, Yakima, Wash., Sanitary Engineer, City-County Health Dept.

John B. Miller, B.S., State Board of Health, Jacksonville, Fla., District Supervisor, Community Sanitation and Malaria Control, U. S. Public Health Service

Edward F. Mulligan, 701 Hecla St., Ironton, Ohio, Sanitary Officer, Health Dept.

Francis Patterson, N. Main, Rocky Mount, N. C., Sanitary Inspector, Dept. of Health

Jacob S. Shuey, LL.B., Health Dept., Cincinnati, Ohio, Chief, Bureau of General Foods and Sanitation

J. A. Willman, M.S., Dept. of Health, Columbus, Ga., Sanitary Engineer, City-County Health Dept.

Industrial Hygiene Section

William I. Clark, M.D., Norton Co., Worcester, Mass., Chief Surgeon, Norton Company, and Assistant Professor of Industrial Medicine, Harvard Univ. School of Public Health

Earl W. Dakan, B.S., 610 43rd St., Oakland, Calif., Assistant Engineer, Industrial Hygiene Service, State Dept. of Health

Melvin W. First, B.S., Health Dept., City Hall, Saginaw, Mich., Industrial Hygienist

Gordon C. Harrold, Ph.D., Dodge Plant, Chrysler Corp., 7900 Jos Campau, Detroit, Mich., Chief Chemist, Industrial Hygiene Laboratories

Herman L. Hegner, M.D., 609 Charles St., Wellsburg, W. Va., Director, Brooke Serological Laboratory

Charles N. Scott, M.D., American Viscose Corp., Nitro, W. Va., Plant Physician

Donald McKay Shafer, M.D., 14 W. 49th St., New York, N. Y., Associate Consultant, National Association of Manufacturers

Clemens J. Taylor, R.N., 330 East 27th St., Apt. 5B, New York, N. Y., Head Nurse, Bellevue Hospital

Food and Nutrition Section

Mary E. Aiken, B.S., 253 Maple Ave., Edgewood, Pittsburgh, Pa., Bacteriologist, H. J. Heinz Co.

Jacob W. Forbes, B.S., 807 6th Ave., Helena, Mont., Director, Food and Drug Division, State Board of Health

Edward M. Kennelly, D.V.M., 7 Stewart Place, White Plains, N. Y., Veterinarian, Westchester County Dept. of Health

Louis Lang, M.A., National Sugar Refining Co., Edgewater, N. J., Chief Chemist

Amalia E. Lautz, Ph.D., Michigan Dept. of Health, Lansing, Mich., Chief, Division of Nutrition, Bureau of Maternal and Child Health

Charles J. Rickher, M.S., 807 W. Nevada, Urbana, Ill., Student, Univ. of Illinois

Franklin L. Schacht, Ph.D., R. No. 1, East Greenbush, N. Y., Supervising Milk Inspector, State Dept. of Health

Charas Yamarat, M.B., M.P.H., 55 Shattuck St., Boston, Mass., Student, Harvard School of Public Health

Maternal and Child Health Section

Ann Marie Conners, R.N., 609 Charles St., Wellsburg, W. Va., Office Nurse and Secretary, Brooke Serological Laboratory

Mason G. Lawson, M.D., Box [illegible], Benton,

Ark., Medical Director, District 10, State Board of Health

Anthony R. Di Nubile, D.D.S., 846 Wharton St., Philadelphia, Pa., Assistant to Chief Dentist, Child and Maternal Health Dept. State Health Dept.

Ruth J. Raattama, M.D., M.P.H., 904 South Second St., Springfield, Ill., Pediatrician, Division of Child Hygiene and Public Health Nursing, State Dept. of Health

Muriel K. G. Robinson, D.D.S., 4906 Walnut St., Philadelphia, Pa., Dentist, State Health Dept.

Lydia L. Verbarg, M.D., Rt. 1, Box 27, San Jose, Calif., School Physician, San Jose School Dept.

Public Health Education Section

Carl L. Anderson, M.S., Dr.P.H., Utah State Agricultural College, Logan, Utah, Associate Professor of Public Health

Mary J. Culver, R.N., State Teachers College, Cheyney, Pa., Resident College Nurse

Herbert W. Cummings, B.S., 15 Woodlawn Ave., Albany, N. Y., Assistant Director, Division of Syphilis Control, State Dept. of Health

Mary M. Kaczka, R.N., 4857 Homerlee Ave., East Chicago, Ind., School Nurse, Board of Education

Adrien Plouffe, M.D., D.P.H., St. Hubert 3929, Montreal, P. Q., Can., 1st Assistant Director, Dept. of Health

Walter S. Weisz, D.D.S., 1831 Murray Ave., Pittsburgh, Pa., Member, Child Health Program, Odontological Society

Public Health Nursing Section

Laura C. Gahn, C.P.H., Dept. of Health, Tucson, Ariz., Supervising Nurse, Pima County Health Unit

Marion Irving, B.S., 123 Green St., Kingston, N. Y., Supervising Public Health Nurse, State Dept. of Health

Therese Kerze, A.M., 168 West 225th St., New York, N. Y., Assistant Director, Judson Health Center

Madeline C. Klingbeil, R.N., 33 Pearl St., Pittsfield, Mass., Executive Director, Pittsfield Visiting Nurse Assoc.

Mildred C. Lant, B.S., 25 Monroe Place, Brooklyn, N. Y., Supervising Nurse, New York City Dept. of Health

Beryl E. Lusow, B.S., R.N., 13524 Tuller, Detroit, Mich., Educational Director, Nursing Division, Dept. of Health

Lorena J. Murray, M.S., 1709 Washington Ave., St. Louis, Mo., Nursing Field Consultant, American Red Cross

Elizabeth A. Neubert, R.N., 2102 Cornell Road, Cleveland, Ohio, Staff Nurse No. 1, Anderson-Campbell County Health Dept.

Florence E. O'Connor, R.N. 798 Thayer St., Akron, Ohio, Staff Nurse, Summit County Health Dept.

Virginia M. Ohlson, R.N., 5254 N. Spaulding, Chicago, Ill., Public Health Nurse, Evanston Health Dept.

Thais W. Pope, R.N., Sneads, Fla., Staff Nurse, Gadsden County Health Dept.

Julia D. Smith, R.N., M.A., I.V.N.A., 223 S. Cherry St., Richmond, Va., Educational Director

Dorothy Strogoff, B.S., 5 Ivanhoe Road, Worcester, Mass., Public Health Nursing Supervisor, State Dept. of Public Health

Lucia M. Sweeton, M.A., Acting Director of Public Health Nurses, Catholic Univ., Washington, D. C.

Angie F. Waldrum, R.N., 1011 W. 6th, Little Rock, Ark., Chief Nurse, Health Dept.

Florence Whipple, R.N., 1006–11th Ave., Helena, Mont., Supervisor, Public Health Nursing, State Board of Health

Epidemiology Section

P. Paul Chunko, 41 North Saylor St., Annville, Pa., Statistician, Division of Epidemiology, State Dept. of Health

Horace L. Hodes, M.D., Sydenham Hospital, Baltimore, Md., Director, Medical Research, City Health Dept.

Alvin E. Keller, M.D., Vanderbilt Univ., School of Medicine, Nashville, Tenn., Associate Professor of Preventive Medicine and Public Health

Philip E. Sartwell, M.D., M.P.H., 12 Darling St., Marblehead, Mass., Assistant Director, Division of Tuberculosis, State Dept. of Public Health

Erich Seligmann, M.D., 414 West 120th St., New York, N. Y., Assistant Professor of Public Health, Delamar Institute of Public Health, Columbia Univ.

Unaffiliated

Arthur L. Barbakoff, M.D., 322 N. State St., Ann Arbor, Mich., Student, Univ. of Michigan

Albert J. Beckmann, A.B., Univ. of North Carolina, Division of Public Health, Chapel Hill, N. C., Student

Michael Berkowitz, D.D.S., 3715 Kings Highway, Brooklyn, N. Y., Practising Dentist, Unity Hospital

Joseph P. E. Brady, Public Health Dept., 25 Union Terrace, Aberdeen, Scotland, Chief Assistant Divisional Sanitary Inspector, Aberdeen County Council

Jules B. Comroe, M.D., 1729 Arch St., Berkeley, Calif., Venereal Disease Clinician, State Dept. of Public Health

Leon B. Comroe, M.D., 1729 Arch St., Berkeley, Calif., Venereal Disease Clinician, State Dept. of Public Health

Thomas G. Ellis, B.S., R. 1, St. Pauls, N. C., Trainee in Sanitation, Vanderbilt Univ.

Earl W. Hawkins, Health Dept., Civic Center, San Diego, Calif., Food Inspector

Grady Lewis, 1301 Florida Ave., Tampa, Fla., Hillsbrough County Sanitary Officer

Rafael Risquez-Iribarren, M.D., 615 N. Wolfe St., School of Hygiene and Public Health, Johns Hopkins Univ., Baltimore, Md., Student

DECEASED MEMBERS

Levi. A. Barnett, M.D., Greenwood, Miss., Elected Member 1932

W. A. Brumfield, M.D., Farmville, Va., Elected Member 1915

Frederick D. Carr, M.D., Batavia, N. Y., Elected Member 1934

Robert C. Cook, M.D., Springfield, Ill., Elected Member 1925

Charles Daligny, M.D., Troy, N. C., Elected Member 1937

John S. Douglas, M.B., D.P.H., Halifax, N. S., Canada, Elected Member 1936

Prof. Frederick P. Gay, M.D., New York, N. Y., Elected Member 1924

Edith Gordon, M.D., Dr.P.H., Toronto, Ont., Canada, Elected Member 1921

Margaret A. Paul, R.N., Lansdowne, Pa., Elected Member 1932

C. C. Threlkel, M.D., Morgantown, Ky., Elected Member 1932

PERSONNEL OF THE COMMITTEE ON RESEARCH AND STANDARDS

THE Executive Board has recently made several appointments to the Committee on Research and Standards to fill vacancies occasioned by the expiration of terms at the last Annual Meeting. The personnel of the committee is not given in full in the *Year Book* since that publication was already on the press when the appointments were made. Below is given the full membership of the committee and the terms for which they have been appointed:

Kenneth F. Maxcy, M.D., *Chairman* (1942)
Reginald M. Atwater, M.D., *Secretary*
Gaylord W. Anderson, M.D. (1942)
Margaret G. Arnstein, R.N. (1940)
E. L. Bishop, M.D., Chairman, Committee on Administrative Practice (*ex officio*)
Richard A. Bolt, M.D. (1940)
Halbert L. Dunn, M.D. (1942)
Haven Emerson, M.D. (1941)
Gordon M. Fair (1942)
Walter S. Frisbie (1941)
A. Parker Hitchens, M.D. (1940)
John F. Norton, Ph.D. (1940)
George C. Ruhland, M.D. (1941)
Thomas F. Sellers, M.D. (1941)
L. R. Thompson, M.D. (1941)
Walter von D. Tiedeman, M.C.E. (1942)
Clair E. Turner, Dr.P.H. (1940)
Abel Wolman, Dr.Eng., *Consultant*

EMPLOYMENT SERVICE

The Employment Service will register persons qualified in the public health field without charge.

Replies to these advertisements, when keyed, should be addressed to the American Public Health Association, 50 West 50th Street, New York, N. Y., identifying clearly the key number on the envelope.

POSITIONS AVAILABLE

MUNICIPAL CIVIL SERVICE COMMISSION CITY OF NEW YORK

Applications will be received between February 8 and March 21 for
District Health Officer

Open to all qualified citizens of the United States

Duties: Administrative charge of the activities of the Health Department in a Health District of about 250,000 population in New York City.

Requirements: An M.D. degree from a recognized school, 1 or more years of graduate training in a public health institute, and satisfactory experience of at least 2 years as a health officer or 3 years' experience in a responsible administrative position in public health.

Vacancies: 2, at $4,750 per annum.

Applications and full information may be obtained by writing to the Municipal Civil Service Commission, 299 Broadway, New York City.

POSITIONS AVAILABLE

Young, energetic, well trained public health nurses needed in Montana for rural areas. Salary $135 per month, plus travel. Write Supervisor of Public Health Nursing, Montana State Board of Health, Helena, Mont.

POSITIONS WANTED

ADMINISTRATIVE

Well qualified physician, with M.P.H. from Johns Hopkins, and experienced as county health officer and now assistant health officer in a large city, will consider county or city administrative position. A383

Physician, M.D., Yale; M.S.P.H., Columbia; also short course for Health Officers, Vanderbilt; good clinical background; 23 months' public health experience, chiefly in county work; will consider appointment in child health, epidemiology or public health administration. A350

Physician, M.D., University of Cincinnati; with postgraduate training in venereal disease control, Johns Hopkins; is available as venereal disease control officer. A363

Physician, M.P.H., Harvard; well experienced in city and rural health administration, will consider appointment as district health officer or in city or state health department. A418

Well qualified physician, M.D., Rush; M.S.P.H., University of Michigan; with 3 years' residence in tuberculosis, and special interest in venereal disease control, seeks responsible appointment. Excellent references. A406

Physician, with C.P.H., Johns Hopkins, and some field experience with large state health department, wishes position in epidemiology or administration. A443

Physician, M.D. class A medical school; 12 years' public health experience; now employed with state department of health; will consider opening with well organized city or state department in communicable disease division, or epidemiology, or both. A409

HEALTH EDUCATION

Well qualified woman physician, M.A. and M.D. from Stanford, with 6 years' experience in nationally known secondary school in health education and medical advisory duties, wishes position in college health work. H448

Well qualified woman in health education wishes position as health coördinator or health counselor. Has wide experience, and Ph.D. from New York University. H236

LABORATORY

Experienced bacteriologist, young man of 33, Sc.B., who for several years has been in charge of state laboratory doing public health and diagnostic bacteriology, immunology and serology, will consider opening. L427

Experienced teacher in bacteriology and public health, Ph.D., Cornell; now professor in grade A medical school, will consider teaching, executive or administrative position. L327

Experienced teacher in biochemistry and bacteriology; Ph.D., Iowa; now laboratory director in midwestern state; will consider teaching, executive or administrative position. L440

Broadly experienced laboratory director with excellent background, now employed southern state, seeks responsible position in laboratory work or teaching of bacteriology, immunology, or pathology. L426

MISCELLANEOUS

Public health engineer, B.S., in Civil and Sanitary Engineering; C.P.H., University of North Carolina; 3 years' experience with state department of health as field supervisor during which time he was in charge of shellfish sanitation; also experienced as district sanitarian; seeks position in public health engineering field. E430

Public health nurse, college graduate, Bachelor of Nursing, Yale University, 3 years' experience in rural South, desires position part teaching, part clinic or student advisory work, in teachers college. N449

Positions Available

COUNTY HEALTH OFFICERS—Several; preferably young southern physicians or men who have lived in the South; arrangements made for training if lacking in public health experience; about $225. PH-30, Medical Bureau, Palmolive Building, Chicago.

STUDENT HEALTH PHYSICIAN — Recent graduate who will have completed internship by summer of 1940; state co-educational college with staff of 5 full-time physicians; college hospital averages 40,000 office calls, 900 hospital admissions yearly; $1,800 for 9 month year. PH-31, Medical Bureau, Palmolive Building, Chicago.

SCHOOL PHYSICIAN—One who will be genuinely interested in the work of an educational group carrying on a progressive educational program among mountain people; physician's headquarters will be the school but service will extend to the entire community; monthly guarantee of $150. PH-32, Medical Bureau, Palmolive Building, Chicago.

PUBLIC HEALTH NURSE—One with adequate experience in public health nursing to direct a visiting nurse staff of nearly 20; eastern industrial city; $2,800. PH-33, Medical Bureau, Palmolive Building, Chicago.

PUBLIC HEALTH NURSE—To become supervisor of public health nursing association in city of approximately 50,000; work well organized with heavy bedside nursing program; duties would begin in September. PH-34, Medical Bureau, Palmolive Building, Chicago.

PUBLIC HEALTH NURSE—Qualified to serve as consultant in venereal diseases for public health nursing organization; minimum requirements: degree, year's course in public health, public health supervising experience; must be specially trained in venereal disease work or willing to acquire training at own expense; initial stipend $250 monthly. PH-35, Medical Bureau, Palmolive Building, Chicago.

STUDENT HEALTH NURSE—Registered nurse with minimum 2 years' college training, for general duty in college infirmary; must be under 35 years of age; exclusive junior college for young women; $100, meals; 9 month appointment. PH-36, Medical Bureau, Palmolive Building, Chicago.

TECHNICIAN — Immediate appointment with municipal health laboratory; must be qualified as chemist and diagnostic bacteriologist; $150. PH-37, Medical Bureau, Palmolive Building, Chicago.

Situations Wanted

BACTERIOLOGIST—B.S., M.A. and Ph.D. degrees, state university; 10 years, teaching and research, including instructorship state laboratory of hygiene; would like research appointment in public health laboratory, or university teaching connection, affording unusual research opportunities; for further information write Burneice Larson, Medical Bureau, Palmolive Building, Chicago.

YOUNG WOMAN PHYSICIAN—Extensive graduate training in pediatrics; 4 years, child hygiene division, state health department; several years, private practice pediatrics; wishes to return to full-time public health work: for further information write Burneice Larson, Medical Bureau, Palmolive Building, Chicago.

PUBLIC HEALTH PHYSICIAN—A.B., midwestern college; M.D., Johns Hopkins; M.S.P.H., University of Michigan; interesting record of successful experience; for further information write Burneice Larson, Medical Bureau, Palmolive Building, Chicago.

PUBLIC HEALTH NURSE is available; B.S. degree; scholarship at Merrill Palmer Nursery School; graduate of teaching hospital; excellent record in public health and executive nursing; experience consists of several years' successful supervising and 5 years' executive work in public health nursing; for further information write Burneice Larson, Director, Medical Bureau, Palmolive Building, Chicago.

NEWS FROM THE FIELD

THE PRESIDENT'S HOSPITAL PROGRAM

EXPRESSING a concern over the inequalities that exist among the states as to health services and resources with which to furnish such services, President Roosevelt on January 30 sent a message to Congress recommending a new hospital project. The President referred to the Interdepartmental Committee report and his message of January 23, 1939, and stated that conditions as described a year ago are substantially unchanged. He expressed the belief that there is still need for the federal government to participate in strengthening and increasing the health security of the nation. He urged an active study by a committee of Congress of health legislation, looking toward constructive legislative action at the next session. He indicated that he had asked the Interdepartmental Committee under Miss Josephine Roche to continue its studies.

Specifically the President proposed a program for the construction of small hospitals in needy areas of the country, especially in rural areas not now provided. In the belief that this provision of hospitals in the areas of special need will greatly improve existing health services, will attract competent doctors and will raise the standards of medical care, the President pointed out that the new hospitals would serve the additional purpose of providing laboratory and other diagnostic facilities for the use of local physicians and accommodations for local health departments. He proposed that these hospitals should be built only where they are most needed and not in communities where public or private institutions are already available to the people in need of service. He proposed that approval of hospital construction projects should be a function of the Surgeon General of the Public Health Service, with the advice of an advisory council consisting of outstanding medical and scientific authorities expert in this field.

The message assumes that proposed projects would be submitted by responsible public authorities with assurance that adequate maintenance will be provided, and after a study of existing local hospital facilities and needs. He said that the Surgeon General should establish standards for organization, staff and continuing operation. He indicated special need for the care of the tuberculous in many areas of the South where there were acute needs for the care of Negro patients. He suggested simple functional structures, utilizing inexpensive materials and construction methods. Title is to be held by the federal government, but operation would remain a local financial responsibility.

The President recommended enabling legislation for this program and that a sum of between 7½ and 10 million dollars should be appropriated to the Public Health Service to inaugurate the program during the next fiscal year. This proposal, he pointed out, is not a renewal of the Public Works Program through the method of grants-in-aid, because the areas which are proposed as the locations of these hospitals are to be in areas so poor that they cannot raise their share of the cost of building and equipping a hospital. The President expressed the opinion that the cost of building and equipping a 100 bed hospital in these areas where construc-

tion costs will be low can be kept down to between $150,000 and $200,000, and his program accordingly calls for 50 such hospitals.

The project was proposed as an experiment because the nation will gain much experience by undertaking this venture. In the words of the President: "At the very least it will save lives and improve health in those parts of the Nation which need this most and can afford it least."

It is reported from Washington that the powerful groups interested in a National Health Program, while approving this hospital building program, are unlikely to regard it as an adequate substitute for the larger plan. It has been declared as acceptable to the American Medical Association.

Implementing the President's proposal, a bill was introduced jointly in the Senate on February 1 by Senators Wagner and George, carrying an authorization for 10 million dollars. The actual construction work under this program will be carried out by the Federal Works Agency, and the Federal Security Administrator is authorized to accept on behalf of the United States gifts of money, equipment, and land to be utilized in carrying out the purposes of the program. The administration of the program will be guided by a National Advisory Hospital Council, consisting of the Surgeon General of the Public Health Service as Chairman and six members selected by him from leading medical or scientific authorities who are outstanding in matters pertaining to hospital and other public health services.

CONFERENCE ON CHILDREN IN A DEMOCRACY

THIS Conference was called by the Secretary of Labor, Frances Perkins, at the direction of President Roosevelt. It held its first session April 26, 1939, and its second session January 18–20, 1940. The Conference was made up of 460 invited representatives of many agencies concerned with child health and welfare, including education, recreation, religion, and many other aspects. Approximately 20 per cent of the members of the Conference had some relationships with medicine, nursing, or public health.

This was the fourth White House Conference on Children, previous Conferences having been held in 1909, 1919, and 1930. Because of the special emphasis put upon child health at the Conference in 1930, it was surprising to some delegates to find the emphasis so largely on subjects other than child health, but it is recalled that the first two conferences treated health rather incidentally, and it will be seen from the following topical reports made to the Conference that public health and medicine were treated as but one part of the interests of children in a democracy.

Topical reports were prepared on the following eleven subjects:

- The Family as the Threshold of Democracy
- Economic Resources of Families and Communities
- Housing the Family
- Economic Aid to Families
- Social Services for Children
- Children in Minority Groups
- Religion and Children in a Democracy
- Health and Medical Care for Children
- Education Through the School
- Child Labor and Youth Employment
- Leisure-Time Activities

The general Conference report, which was presented at the January sessions and accepted with certain revisions, covers 50 mimeographed pages. The report addresses itself to the interest of all the children in the nation and to every aspect of child welfare, including home life, material security, education, health and general preparation for the responsibilities of citizenship.

Reviewing the interval since the last Child Health Conference in 1930, the

report points out that it is to the everlasting credit of this democracy that, despite the strains of the past decade, we have not only maintained our social institutions and public services but have notably improved some of them. The resiliency of this commonwealth and its ability to avoid any serious loss of morale under long continued hardships have proved it to be a more stable government and one better adapted to a machine age civilization and more capable of meeting new human needs by democratic methods than might have seemed possible in the early years of prosperity and expansion. However, it was pointed out that the purpose of the Conference was not to boast of the achievements of the democracy in prosperity and in depression but rather to press forward to achievements worthy of the freedom and wealth of the nation. It was the special obligation of the Conference to point out the shortcomings and deficiencies that still exist.

The report then proceeds to describe the great inequalities which have been discovered throughout the country in the available opportunities for children and youth in rural areas, in low income groups, among the unemployed, among migrant workers and in various minority groups. "Honest inquiry has uncovered conditions unworthy of a democracy and dangerous to its future."

The Conference met for two and one-half days under the Chairmanship of the Secretary of Labor, and on the second evening was entertained at the White House, where the President spoke to the Conference and over a national radio hookup. The President said that the success of democratic institutions is measured not by the extent of territory, by financial power, machines or armaments, but by the desires, the hopes and the deep lying satisfaction of the individual men, women, and children who make up a citizenship.

In an address to the Conference, Homer Folks, the Chairman of the Report Committee, challenged the Conference by pointing out that somewhere within these United States within the past few years a child was born who will be elected in 1980 to the most responsible office in the country—the Presidency of the United States. "We cannot guess his name or whereabouts. He may come from any place and from any social or economic group. He may now be in the home of one of the soft coal miners, or in the family of a sharecropper, or quite possibly in the home of one of the unemployed, or in a family migrating from the dust bowl, or he may be surrounded with every facility, convenience and protection which money can buy. If we could unroll the scroll of the future enough to read his name and whereabouts, how many things we would wish to have done for him, how carefully we would wish to guard his health, his surroundings, his education, his associates, his travels, his ambitions." It was the sense of the Conference that what we might wish to do for that unknown child, the future president, we must be ready to do for every child so he may be ready to live a full life satisfying to himself and useful to his community and nation.

Recognizing the immediate necessity for providing against the material dangers of the moment, the Conference was impressed with the equal necessity for maintaining the internal strength and confidence among the people of this democracy. "If the American people in a world showing many signs of breakdown can present a picture of a nation devoting thought and resources to building for the distant future, we shall strengthen by these very actions our own faith in our democracy."

"Holding these convictions and recognizing them as our common heritage, the Conference pledges its members and calls upon all other

citizens to press forward in the next ten years to the more complete realization of those goals for American childhood which have become increasingly well defined from decade to decade."

An extensive program of action to follow up the Conference itself was presented by Saidie Orr Dunbar, President of the General Federation of Women's Clubs, who asserted that nation-wide planning is only the beginning of a program for making the Conference mean something to individual children. "It is not a matter of creating new agencies," Mrs. Dunbar said, "but of providing a continuing source of information and direction for existing agencies."

NATIONAL HEALTH COUNCIL ELECTS OFFICERS

THE following new officers of the National Health Council, New York, N. Y., have been elected:

President—Kendall Emerson, M.D.
Vice-President, and Chairman of the Executive Committee—Reginald M. Atwater, M.D.
Treasurer—Frederick Osborn
Secretary—Dorothy Deming
Directors—Term expiring 1942—
George Stevenson, M.D.
Mrs. Eleanor Brown Merrill
Louis I. Dublin, Ph.D.
William DeKleine, M.D.
Nathan B. Van Etten, M.D.
N. P. Neilson, Ph.D.
Ray Lyman Wilbur, M.D.

Term expiring 1941—
Thomas Parran, M.D.
Martha M. Eliot, M.D.
R. M. Atwater, M.D.
George Baehr, M.D.
Edmund P. Fowler, M.D.
C. C. Little, Ph.D.
Howard Green

Term expiring 1940—
S. H. Osborn, M.D.
Homer Folks
Donald B. Armstrong, M.D.
William F. Snow, M.D.
M. A. Bigelow, Ph.D.
Fred Hopkins
Walter C. Clarke, M.D.

TUBERCULOSIS TESTS OF MARITIME WORKERS

THE Tuberculosis Health Service of the Work Projects Administration, in association with the Tuberculosis Bureau of the New York City Health Department, will extend its service to another labor group on March 4, when the mobile x-ray unit will be set up at the headquarters of the National Maritime Union of America, to examine the 10,000 members of this union until all the members desiring the service have been x-rayed.

The National Maritime Union is the latest of a long list of labor union groups to request this WPA service. Other unions already surveyed include the Fur Workers of America, Knit Goods Workers Union, the Cooks and Chefs Union, and the Hotel and Restaurant Workers.

RADIO SCRIPTS EXCHANGE

THE National Committee of the Social Welfare and Public Health Department of the American Home Economics Association offers radio talk material from its library of radio scripts.

The Committee on Exchange of Radio Scripts of the New York City Department of Health reports a growing use of the service, and says it is continually adding to its library of radio scripts dealing largely with the subject of food and nutrition, and also home planning. These may be borrowed by writing to the Chairman, Pauline Murrah, 303 Ninth Avenue, New York, N. Y.; there is no fee, but it is requested that the committee be reimbursed for the carrying charges.

PUBLIC WORKS

THE press reports that Senator James F. Mead, on February 1, introduced a bill into the Senate to authorize federal loans up to a total of

$300,000,000 to finance such public works as hospitals, improvement of water and sewer systems and elimination of stream pollution for localities. The money would be lent on terms up to 50 years with a flat interest rate of 2 per cent.

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

AMONG the officers of the A.A.A.S. for 1940 are: President, A. F. Blakeslee, Carnegie Institute of Washington, Cold Spring Harbor, N. Y. Vice-Presidents, who are also Chairmen of corresponding sections, include: Robert L. Sackett, Pennsylvania State College, Engineering Section, and Paul R. Cannon, University of Chicago, Medical Sciences. F. R. Moulton continues as permanent Secretary.

UNIVERSITY OF CALIFORNIA STUDIES

IT is announced that the study of bacteriophage will be continued at the University of California under a grant of $2,430 from the John and Mary R. Markle Foundation of New York, N. Y., under Dr. Albert P. Krueger, Professor of Bacteriology.

Another grant from the same foundation is announced to the University of Minnesota for studies in the metabolism of asthmatic patients. The University also announces a gift of $5,000 from John Dwan of St. Paul to support a serum center, and an annual grant for cancer research which has been increased to $10,000 a year for the next three year period. The latter is being conducted by the Departments of Surgery, Pathology and X-ray Therapy at the University of Minnesota Hospital. A fellowship at the University of Minnesota for special graduate training in cancer research has been announced, and a grant of $16,000 from the Marber Oil Company of Minneapolis to support investigations of the relation of diet and activity to cancer.

LECTURES ON MEDICAL CARE

A SERIES of lectures on medical care under the DeLamar Foundation of the School of Hygiene and Public Health of Johns Hopkins University have been held during January and February, the last lecture on February 2.

Among the speakers were: Dr. Nathan B. Van Etten, President-elect of the American Medical Association; Dr. Edward S. Godfrey, Jr., Commissioner of Health of the State of New York and President of the American Public Health Association; Dr. I. S. Falk, Chief of Health Studies, Bureau of Research and Statistics, Social Security Board; Dr. R. C. Williams, chief medical officer of the Farm Security Administration; Dr. W. S. Rankin, Director of the Hospital and Orphan Section of the Duke Endowment; J. D. Colman, Director of the Associated Hospital Services of Baltimore; Dr. Kingsley Roberts, Medical Director of the Bureau of Cooperative Medicine, and Dr. Nathan Sinai, of the Division of Hygiene and Public Health of the University of Michigan.

SOCIAL HYGIENE BOARD IN VIRGINIA

A NEW Social Hygiene Board has recently been organized in Arlington County, Va., to work in close conjunction with the Health Department. Dr. R. G. Beachley, Director of Health and Welfare of this county, is a member of this Board and participated in its organization.

The purpose of this Board is to work in close harmony with the Health Department in an effort to control and eradicate venereal disease in this community.

The objectives of the Social Hygiene Board are as follows:

1. The promotion of all available means of eradicating syphilis and gonorrhea.
   (a) By educational measures—calling these diseases by their right names and cultivating a proper attitude toward them.

2. Medical measures.
   (a) Promoting the establishment of clinics by the proper medical authorities for the treatment of medically indigent cases.
   (b) Assisting the medical authorities in every effort they may make toward the control of "quack doctors" and the dispensing of "quack remedies," to infected individuals.

INSTITUTES

HOW to run an institute is told by implication in Professor Ira V. Hiscock's account of the organization, content, and conduct of the very successful Institute on Public Health Education held in connection with the Pittsburgh Annual Meeting which he directed. It is published in the 1939–1940 *Year Book,* and while it is a factual statement of the step-by-step development of a specific project, the scheme is adaptable to any effort to bring a group of people together for hours or days of intensive training. The procedure described by Professor Hiscock is complete to the point of including the careful instructions to leaders of group discussions and for rapporteurs. It ends with a series of recommendations and suggestions which presumably would be put into effect if Professor Hiscock were doing the job over again.—The A.P.H.A. *Year Book* is a supplement to February, 1940, issue of the *American Journal of Public Health.*

FOOD TECHNOLOGISTS MEETING

THE first meeting of the Institute of Food Technologists is to be held June 17–19, at the Morrison Hotel, Chicago, Ill.

The program will consist of four 3 hour sessions devoted to symposiums on Food Engineering and on Influence of Processing on Vitamin Content of Food, supplemented by voluntary and solicited papers on food preservation, composition of foods, methods of analysis of foods, and packaging of foods. The third day is to be spent in visiting plants characteristic of Chicago's food industry.

Titles and abstracts of all volunteer papers to be tendered for inclusion in the program must be submitted for approval not later than March 1 to the Chairman of the Program Committee, Dr. D. K. Tressler, New York State Agricultural Experiment Station, Geneva, N. Y.

NEW YORK FOOD INDUSTRIES WORKERS TO BE EXAMINED

THE X-ray examination of members of the Cooks and Chefs Union and of the Hotel and Restaurant Workers, Local No. 16, was begun by the Tuberculosis Service of the Works Projects Administration on December 18. This WPA Tuberculosis Service is conducted in coöperation with the New York City Department of Health and is part of the campaign to provide this service to trade organizations for the protection of the health both of the workers and the public. A total of 10,000 members in the two unions is expected to report for examination.

MICROFILM SETS OF PERIODICALS

THE Committee on Scientific Aids to Learning—President Conant of Harvard, Chairman—has made a grant to cover the cost of making a microfilm master negative, on the most expensive film, of sets of volumes of scientific and learned journals.

This permits the non-profit Bibliofilm Service to supply microfilm copies at the sole positive copy cost, namely 1 cent per page for odd volumes, or a special rate of ½ cent per page for any properly copiable 10 or more consecutive volumes.

The number of pages will be estimated on request to: American Documentation Institute, Care Offices of

Science Service, 2101 Constitution Ave., Washington, D. C.

ANTHRAX REPORT

ANYONE desiring a copy of the Report of the Committee on Industrial Anthrax (Henry Field Smyth, M.D., Chairman) may obtain it by writing to: Division of Industrial Hygiene, U. S. Public Health Service, National Institute of Health, Bethesda, Md.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY SCHOLARSHIP FOR PUBLIC HEALTH NURSE

A FULL-TUITION scholarship in health education is offered again this year to a public health nurse, by the Massachusetts Institute of Technology, at Cambridge, Mass. This scholarship of $600 covers the cost of tuition for the scholastic year, beginning in September, 1940, and closing in June, 1941.

The scholarship will be awarded to a candidate recommended by the National Organization for Public Health Nursing. The award will be based upon the nature and quality of the previous academic work of the applicant, the ability which she has already shown in professional work in the field of public health, her need for scholarship aid, and the probable value of her further contribution to health education. Consideration will be given only to those candidates who possess a bachelor's degree. Those possessing a degree may count their work at the Institute toward a Certificate in Public Health.

The scholarship will be awarded in June, 1940, and applications should be received not later than May 1. All those who are interested in this scholarship may write to the National Organization for Public Health Nursing, 50 West 50th Street, New York, N. Y., for application blanks.

NATIONAL EDUCATION ASSOCIATION

THE American Association for Health, Physical Education, and Recreation—which is a division of the National Education Association—will meet at the Hotel Stevens, in Chicago, Ill., April 24–26.

At the meeting of the School Nursing Section there will be a discussion of the status of the school nurse in this country, and the probable funds available from the United States Government for training school health personnel.

ROCHESTER MUSEUM

IT has been announced that Edward Bausch, Chairman of the Board of the Bausch & Lomb Optical Company, Rochester, N. Y., and his wife, presented their home and spacious grounds to the City of Rochester for a new home for Rochester's Municipal Museum, now in crowded quarters. They will construct the first unit of the new museum at their own expense.

Dr. John R. Williams is Chairman of both the Rochester Municipal Museum Commission and of the Board of Trustees of the Rochester Museum Association. Dr. Arthur C. Parker has been Director of the Museum since 1925. The Bausch & Lomb Optical Company have done much for the advancement of science over a long period, dating back to Henry Lomb's active support of the Rochester Public Health Association and the Lomb Prize thirty years ago.

LAYMEN'S LEAGUE AGAINST EPILEPSY

POINTING out that epilepsy (for which the substitute terms "convulsive seizure" and "cerebral dysrhythmia" are proposed) is both widespread and devastating and that in the United States there are at least half a million persons subject to seizures, a group of doctors have organized a League Against Epilepsy, with headquarters at the Harvard Medical School,

Boston, Mass. This medical leadership has joined forces with the public through the newly organized Laymen's League Against Epilepsy.

The object of this Laymen's League is, first, to spread up-to-date and authoritative knowledge about epilepsy and, second, to promote public giving which will lead to the acquirement of more knowledge. The League points out that, beyond other diseases, epilepsy is encrusted with the tough accretion of prejudice and hopelessness. An attitude of defeat surrounds it. This makes it possible for the vendors of patent medicines to bombard victims of the disorder with distorted statements and gaudy promises, while hopeful observations lie unused in research laboratories.

The League points out that American manufacturing concerns spend about 4 per cent of their net earnings on research and that if the public should devote even 1 per cent of the direct expenditure by public authorities in the United States for the care of epileptics there would result about $200,000 annually for these studies. Communications may be addressed to William G. Lennox, M.D., Harvard Medical School, Boston, Mass.

MUNICIPAL CIVIL SERVICE ANNOUNCEMENT

IN announcing the examination for District Health Officer in New York City, which is open to nation-wide competition, the Municipal Civil Service Commission justifies the extension to non-residents of the City on the basis that it is required by the State Constitution which compels the selection of public employees "on the basis of merit and fitness." They further state that there are not sufficient qualified candidates in New York City to make the ten appointments anticipated from this list, and that this has been demonstrated by the fact that all the eligibles from the 1936 competitive list which was nation-wide have been appointed, and that a further competitive examination limited to New York City residents in 1939 resulted in a list of but one name which is inadequate to fill the present vacancies. Since public interest requires that these vacancies be permanently filled as soon as practicable, and since the recruitment of sufficient qualified candidates on this basis requires the admission of non-residents, the examination is therefore open to all American citizens. A description will be found on page 310.

NEW ENGLAND HEALTH INSTITUTE

UNDER the auspices of some 16 official and voluntary health agencies, the New England Health Institute has been announced for Hartford, Conn., April 15–19. In effect this is a continuation of the "School of Public Health" originally held in Hartford in 1922 and repeated in 1929, and is again locally sponsored by the Connecticut State Department of Health.

Beginning Monday, April 15, and extending through Friday afternoon, April 19, the Institute will present a notable list of experts in various fields in public health as the faculty. The program will include four simultaneous lectures during each of the six hours of the school day. These lectures are open to all those who are engaged in public health work or interested in the subject. A fee of $1.00 will be charged to cover Institute expenses.

A list of subjects and the Chairmen of each follows:

Public Health Administration—John A. Ferrell, M.D.
Preventable Diseases—Wilson G. Smillie, M.D.
Sanitary Engineering—Roscoe H. Suttie, C.E.
Vital Statistics—Halbert L. Dunn, M.D.
Laboratory—Elliott S. Robinson, M.D.
Venereal Diseases—R. A. Vonderlehr, M.D.

Industrial Hygiene—R. R. Sayers, M.D.
Cancer—C. L. Larkin, M.D.
Tuberculosis—David R. Lyman, M.D.
Child Hygiene—Martha M. Eliot, M.D.
Crippled Children—R. C. Hood, M.D.
Nutrition—George R. Cowgill, Ph.D.
Public Health Nursing—Mary D. Forbes, R.N.
Mental Hygiene—Eugene Kahn, M.D.
Health Education—Clair E. Turner, Dr.P.H.
Milk, Food and Drugs—E. G. Woodward

Information concerning the Institute may be obtained from the State Department of Health, Hartford, Conn.

LEAGUE AWARDS LEON BERNARD PRIZE

THE first award of the Leon Bernard Prize, established by the Health Committee of the League of Nations and consisting of a bronze medal and the sum of 1,000 Swiss francs, was made to Dr. Wilbur A. Sawyer, director of the International Health Division, Rockefeller Foundation, New York, N. Y., at a dinner of the League of Nations Association in New York on January 29, as a tribute to his achievements in the field of yellow fever and to his success in extending medico-social protection to the populations of many countries. The presentation was made by former Surgeon General Hugh S. Cumming.

Through the death of Professor Bernard, in 1934, the Health Committee of the League of Nations lost one of its most prominent members. Being desirous of perpetuating his memory, the committee decided to create a foundation to be known as the Leon Bernard Foundation, the object of which would be the award of an international prize to reward practical achievements in the field of social medicine.

LIVINGSTON FARRAND MEMORIAL MEETING

A MEMORIAL meeting for the late Livingston Farrand, M.D., President Emeritus of Cornell University, was held at the New York Academy of Medicine on January 30, 1940. Among the speakers were: James Ewing, M.D., Simon Flexner, M.D., Homer Folks, Charles J. Hatfield, M.D., Barklie Henry, Albert R. Mann, Albert G. Milbank, Thomas Parran, M.D., Eliot Wadsworth and George E. Vincent.

SYRACUSE UNIVERSITY ESTABLISHES LABORATORY TESTING SERVICE FOR PRINTING TRADE

AS an aid for newspaper and magazine publishers, a laboratory testing service operating through the School of Journalism at Syracuse University, Syracuse, N. Y., has been announced.

A testing laboratory has been organized to investigate advertised products, as well as machinery and other equipment for the printing trade on the request of publishers, through the coöperation of the Goudy Typographic Laboratory and manufacturers of printing and engraving equipment.

PERSONALS

Central States

FRED P. BESTGEN, M.D.,† of Ann Arbor, Mich., has been appointed Director, Pennington County Health Unit, and County Health Officer, with headquarters at Rapid City, S. Dak.

ROLAND R. CROSS, M.D.,† of Dahlgren, Ill., Superintendent of the Health District in Southern Illinois since 1933, has been appointed Assistant Director of the Illinois State Department of Health.

ELEANOR JONES FORD, R.N., recently Director of the North End Clinic in Detroit, Mich., has been appointed Director of the Visiting Nurse Association of Bridgeport, Conn., effective March 1. Mrs. Ford has completed work in public health nursing

* Fellow A.P.H.A.
† Member A.P.H.A.

at Teachers College, Columbia University, New York.

ROBERT F. HALL, M.D.,† of Mason, Mich., Assistant Medical Director of the health unit in Ingham County, has been appointed in charge of the unit in Bay City.

HERMAN B. HILLEBOE, M.D., C.P.H.,† of St. Paul, Minn., Head of the Bureau of Crippled Children of the Division of Social Welfare, has been appointed Medical Coördinator for the Minnesota State Department of Social Security.

JOHN HARVEY KELLOGG, M.D.,† of Battle Creek, Mich., who joined the American Public Health Association in 1878 and who has been continuously identified with the Association longer than any other member, celebrated his 88th birthday on February 26, at Miami Springs, Fla.

LORIN E. KERR, JR., M.D.,† of Charlotte, Mich., has been named Assistant Medical Director of the health unit in Ingham County, succeeding ROBERT F. HALL, M.D.†

DR. WILLIAM F. LYONS, of Coshocton, Ohio, was recently appointed City Health Commissioner, to succeed DR. JACOB D. LOWER.

ROLLA J. SHALE, M.D.,† of Akron, Ohio, has been placed in charge of the health unit for Ontonagon and Baraga Counties, Mich., filling the vacancy caused by the resignation of PEARL A. TOIVONEN, M.D.,† in August. DR. ALEXANDER M. CAMPBELL,† has been serving as temporary Director.

DR. CLYDE L. SMITH, of Fremont, Ohio, has been named City Health Commissioner to succeed DR. EDGAR L. VERMILYA, who had served 31 years.

ANTHONY TRIOLO, M.D.,† of Rapid City, S. D., has been appointed Director of the Division of Maternal and Child Health in the State Health Department.

Eastern States

ERNEST M. MORRIS, M.D.,* formerly Health Commissioner of Fall River, Mass., has been appointed District Health Officer for all of Hampden County in the western part of the state, with offices in Westfield. He succeeds CHARLES E. GILL, M.D.†

DR. MORRIS L. OGAN recently retired after 35 years on the staff of the New York, N. Y., Department of Health. Dr. Ogan was Admisintrative Assistant in the Bureau of District Health Administration in charge of child and school health.

Southern States

LOUIS BLOCK, DR.P.H.,† of Washington, D. C., is now employed by the Bureau of the Census, Division of Vital Statistics, and has charge of the recently formed Institutional Statistics Section.

DR. FREDERICK J. BRADY has been assigned by the U. S. Public Health Service to the School of Tropical Medicine, San Juan, P. R., which is conducted jointly by the University of Puerto Rico and Columbia University, New York. Dr. Brady will conduct research in parasitology.

DR. ROYDON S. GASS, of Franklin, Tenn., who has been in charge of the Field Diagnostic Service for Tuberculosis for several years, has been appointed to take charge of the new Division of Tuberculosis which has been set up in the Tennessee State Department of Health. Included in the new division will be studies and research, case-finding, and hospitalization.

DON W. GUDAKUNST, M.D., DR.P.H.,* has been appointed Medical Director of the National Foundation for Infantile Paralysis. Dr. Gudakunst will have his office in the Foundation's

* Fellow A.P.H.A.
† Member A.P.H.A.

headquarters at 120 Broadway, New York, N. Y. He has recently been associated with the U. S. Public Health Service, formerly was for 15 years with the Detroit Department of Health, and later Commissioner of Health of the State of Michigan. Dr. Gudakunst will coördinate the Foundation's field work with the central office.

RUSSELL W. HART,† formerly Regional Public Health Engineer, Georgia Department of Public Health, with headquarters at Albany, Ga., and more recently at Marietta, Ga., has accepted a position with the City of Atlanta, Ga., as Sanitary Engineer in charge of milk sanitation with the City Health Department.

PASSED ASSISTANT SURGEON FRED W. KRATZ, of the U. S. Public Health Service, Washington, D. C., has been assigned to the New York Office of the Service to act as Venereal Disease Control Consultant of District No. 1. Dr. Kratz will succeed M. F. HARALSON, M.D.,† who has been transferred to become Territorial Health Officer of Hawaii. Dr. Kratz will have responsibility in connection with venereal disease control activities in the Greater New York City Metropolitan Area, and will be associated with Dr. C. C. Pierce, Medical Director, who is the Regional Consultant in District No. 1.

RALPH J. SYKES, M.D.,† of Weldon, N. C., recently Health Officer of Halifax County, has resigned to join the staff of the State Health Department.

J. A. WILLMAN, M.S.,† formerly Regional Public Health Engineer, Georgia Department of Public Health, at Griffin, Ga., has accepted appointment as Chief Sanitary Engineer for the combined City and County Health Department of Muscogee County and Columbus, Ga.

FRANK E. WILSON, M.D.,† of Williamston, N. C., has been appointed Health Officer of Edgecomb County, succeeding LORENZO L. PARKS, M.D., C.P.H.,† who resigned to join the State Health Department of Florida.

Western States

DR. THOMAS C. BALDWIN, of Port Orchard, Wash., has been named Health Officer of Kitsap County.

LENOR S. GOERKE, M.D., C.P.H.,† of McMinnville, Ore., has resigned as Health Officer of Yamhill County, to go to Yolo County, Calif.; DR. HALLISTER M. STOLTE, of Portland, is acting head of the department.

ROSCOE P. KANDLE, M.D., C.P.H.,† of Clovis, N. M., has been appointed District Health Officer, with offices at Pitman, N. J., as of March 1.

MORSE LITTLE, M.D.,† has been appointed Director of the Division of Maternal and Child Health and Crippled Children Services for the Nevada State Department of Health.

DAVID R. RICH, M.D.,† of La Grande, Ore., has been appointed Health Officer of Union County.

† Member A P H A.

CONFERENCES AND DATES

American Academy of Political and Social Science. Philadelphia, Pa. April 12–13.

American Association for Health, Physical Education, and Recreation (division of the National Education Association). Hotel Stevens, Chicago, Ill. April 24–26.

American Association for Social Security. New York, N. Y. April 12–13.

American Association of Pathologists and Bacteriologists. Pittsburgh, Pa. March 21–22.

American Association of Public Health Dentists. Cleveland, Ohio. September 8–9.

American Association of Social Workers (Delegate Conference). Grand Rapids, Mich. May.

American College of Physicians—24th Annual Session. Cleveland, Ohio. April 1–5.

American Dental Association. Cleveland, Ohio. September 9–13.

American Dietetics Association — 23rd Annual Meeting. New York, N. Y. October 21–24.

American Heart Association. Scientific Meeting. Hotel Roosevelt, New York, N. Y. June 7–8.

American Home Economics Association —33rd Annual Meeting. Cleveland, Ohio. June 23–27.

American Hospital Association. Boston, Mass. September 16–20.

American Library Association. Cincinnati, Ohio. May 26–June 1.

American Medical Association — 91st Annual Meeting. Waldorf-Astoria Hotel, New York, N. Y. June 10–14.

American Physiological Society. New Orleans, La. March 13–16.

American Public Health Association —69th Annual Meeting. Book-Cadillac Hotel, Statler Hotel, Detroit, Mich. October 8–11.

American Red Cross—Annual Convention. Washington, D. C. April 1.

American Scientific Congress—8th. In connection with celebration of 50th Anniversary of founding of the Pan American Union. (First Section meeting, May 13.) Washington, D. C. May 10–18.

American Society for Experimental Pathology. New Orleans, La. March 13–16.

American Society for Pharmacology and Experimental Therapeutics. New Orleans, La. March 13–16.

American Society of Civil Engineers. Spring Meeting. Kansas City, Mo. April 17–19. Summer Meeting, Denver, Colo., July 24–26.

American Society of Planning Officials. National Conference on Planning, in coöperation with American Institute of Planners, American Planning and Civic Association, and National Economic and Social Planning Association. San Francisco, Calif. July 8–11.

American Water Works Association—60th Annual Meeting. Kansas City, Mo. April 21–25.

Southeastern Section—Thomas Jefferson Hotel, Birmingham, Ala. March 18–20.

Canadian Section — Hotel London, London, Ont. March 27–29.

Indiana Section—Purdue University, West Lafayette, Ind. April 4–5.

Montana Section—New Milligan Hotel, Miles City, Mont. April 5–6.

Ohio Section — Mayflower Hotel, Akron, Ohio. May 9–10.

Pacific Northwest Section—Portland Hotel, Portland, Ore. May 9–11.

Florida Section — Jacksonville, Fla. May 16–18.

Illinois Section—Congress Hotel, Chicago, Ill. May 22–24.

New York Section — Ithaca Hotel, Ithaca, N. Y. June 6–7.

Southwest Section—Tulsa, Okla. October 14–17.

Arizona Public Health Association. Tucson, Ariz. April 16–17.

Association of American Medical Colleges. Ann Arbor, Mich. October 28–30.

Building Officials Conference of America. St. Louis, Mo. June 3–6.

Central Atlantic States Association of Dairy, Food and Drug Officials—Annual Conference. Hotel Raleigh, Washington, D. C. May 16–17.

Citizens' Conference on Government Management. University of Denver. Estes Park, Colo. June 17–22.

Civil Service Assembly. Central Regional Conference, Chicago, Ill., May 15–17. Western Regional Conference, Portland, Ore., June 24–26. Eastern Regional Conference, June.

Conference of State and Provincial Health Authorities of North America. Washington, D. C. May 7–8. (May 11, at National Institute of Health.)

Conference on Educational Policies—Eighth. Teachers College, Columbia University, New York, N. Y. April 4.

Connecticut Public Health Association. Hartford, Conn. April.

Convention for the Revision of the Pharmacopoeia of the United States. Washington, D. C. May 14.

Dairy Industries Supply Association. Atlantic City, N. J. October 21–26.

Dental Centenary Celebration—Marking 100 Years of Dentistry. (Section on Public Health, March 19, 2:00 P.M.) Baltimore, Md. March 18–20.

Federation of American Societies for Experimental Biology. New Orleans, La. March 13–16.

Florida Public Health Association. Tampa, Fla. December.

Greater New York Safety Convention—11th Annual. Pennsylvania Hotel, New York, N. Y. April 16–18.

Indiana State Medical Association. French Lick Springs Hotel, French Lick, Ind. October 29–31.

Institute of Food Technologists—First Meeting. Morrison Hotel, Chicago, Ill. June 17–19.

Institute of Government. University of Southern California, Los Angeles, Calif. June 10–14.

International Association of Milk Sanitarians. Joint Meeting with the New York State Association of Dairy and Milk Inspectors. Hotel Pennsylvania, New York, N. Y. October 17–19.

International Association of Public Employment Services. Kansas City, Mo. May 14–17.

International Congress on Rheumatism—7th. New York, Boston, and Philadelphia. June 1–10.

Interstate Post-Graduate Medical Assembly. Cleveland, Ohio. October 13–19.

Iowa Public Health Association—14th Annual Meeting. Des Moines, Ia. April 30.

Michigan Public Health Association. Detroit, Mich. October.

Mother's Day. May 12. Tenth annual nation-wide campaign to make maternity safe—Maternity Center Association, New York.

National Association of County Officials. Houston, Tex. April 10–13.

National Association of Housing Officials. William Penn Hotel, Pittsburgh, Pa. May 15–17.

National Association of Purchasing Agents—Governmental Group. Cincinnati, Ohio. June 3–6.

National Biennial Nursing Convention. Bellevue-Stratford Hotel, Philadelphia, Pa. May 11–18.

National Conference of Social Work. Grand Rapids, Mich. May 26–June 1.

National Conference on State Parks. Starved Rock, Ill., and Spring Mill, Ind. May.

National Education Association. Milwaukee, Wis. June 30–July 4.

National Fire Protection Association. Atlantic City, N. J. May 8–11.

National Restaurant Association. Chicago, Ill. October 7–11.

National Safety Council. Chicago, Ill. October 7–11.

National Tuberculosis Association. Hotel Statler, Cleveland, Ohio. June 3–6.

New Mexico Public Health Association. Albuquerque, N. M. May.

New York State Conference of Mayors and Other Municipal Officials. Rochester, N. Y. June 3–7.

New York Tuberculosis and Health Association—Annual Meeting. Joint meeting with the Tuberculosis Sanatorium Conference of Metropolitan

New York. Hotel Pennsylvania, New York, N. Y. March 5, 9:30 A.M. (Afternoon session on heart disease will be held under the auspices of the New York Heart Association.)

Northern Tri-State Medical Association. Battle Creek, Mich. April 9.

Ohio Federation of Public Health Officials. Columbus, Ohio. May 24.

Pan American Sanitary Conference—Joint Session with Conference of State and Provincial Health Authorities of North America. Washington, D. C. May 8.

Pan American Union. Celebration of the Fiftieth Anniversary. Washington, D. C. April 14.

Pennsylvania Public Health Association. Philadelphia, Pa. May 23.

Save Your Vision Week. Sponsored by the American Optometric Association, Inc. Week of March 10.

Smoke Prevention Association — 34th Annual Convention. Hotel Statler, St. Louis, Mo. May 21–24.

Society of American Bacteriologists. St. Louis, Mo. December.

South Carolina Public Health Association. Myrtle Beach, S. C. June.

Special Libraries Association. Claypool Hotel, Indianapolis, Ind. June 3–6.

Symposium on Clinical Experience in Nursing. Catholic University of America, Washington, D. C. June 26–27.

Texas Public Health Association. Fort Worth, Tex. October 7–9.

Tri-State Conference of Food and Health Officials. Pittsburgh, Pa. October.

Western Branch, American Public Health Association — Eleventh Annual Meeting. Denver, Colo. June 24–26.

MEETINGS OF AFFILIATED SOCIETIES
and A.P.H.A. Branches

Society and Secretary	*Next Meeting*
ARIZONA PUBLIC HEALTH ASSOCIATION Marion E. Stroud, Room 100, Arizona State Bldg., Phoenix, Ariz.	Tucson, April 16–17
COLORADO PUBLIC HEALTH ASSOCIATION Helen Cannon, 3136 York St., Denver, Colo.	To be announced
CONNECTICUT PUBLIC HEALTH ASSOCIATION Benjamin G. Horning, M.D., Hartford Board of Health, Hartford.	Hartford, April
FLORIDA PUBLIC HEALTH ASSOCIATION Edward M. L'Engle, M.D., State Board of Health, Jacksonville.	Tampa, December
GEORGIA PUBLIC HEALTH ASSOCIATION Gordon T. Crozier, M.D., Lowndes County Health Commissioner, Valdosta.	Atlanta
IDAHO PUBLIC HEALTH ASSOCIATION Harve J. Carlson, State House, Boise.	To be announced
MASSACHUSETTS PUBLIC HEALTH ASSOCIATION G. Donald Buckner, 69 Coolidge Avenue, Needham.	To be announced
MICHIGAN PUBLIC HEALTH ASSOCIATION Marjorie Delavan, State Department of Health, Lansing.	Detroit, October, 1940
MISSOURI PUBLIC HEALTH ASSOCIATION John W. Williams, Jr., M.D., State Board of Health, Jefferson City.	Jefferson City
NEW MEXICO PUBLIC HEALTH ASSOCIATION Frank W. Parker, Jr., M.D., P. O. Box 1086, Santa Fe, N. M.	Albuquerque, May
NORTHERN CALIFORNIA PUBLIC HEALTH ASSOCIATION Margaret Blee, Instructor in Nursing Education, University of California, Berkeley, Calif.	To be announced
OHIO FEDERATION OF PUBLIC HEALTH OFFICIALS W. D. Bishop, M.D., Darke County Health Unit, Greenville.	Columbus, May 24
PENNSYLVANIA PUBLIC HEALTH ASSOCIATION C. E. Houston, Department of Public Health, Washington, Pa.	Philadelphia, May 23
PUBLIC HEALTH ASSOCIATION OF NEW YORK CITY Frank Kiernan, 386 Fourth Avenue, New York.	To be announced
SOUTH CAROLINA PUBLIC HEALTH ASSOCIATION Ruth George, State Board of Health, Columbia.	Myrtle Beach, June
SOUTHERN CALIFORNIA PUBLIC HEALTH ASSOCIATION R. L. Kaufman, M.D., 402 So. Greenleaf St., Whittier.	To be announced
TENNESSEE PUBLIC HEALTH ASSOCIATION Dr. Robert H. Hutcheson, State Department of Health, Nashville.	To be announced
TEXAS PUBLIC HEALTH ASSOCIATION P. A. Kerby, State Department of Health, Austin.	Fort Worth, October 7–9
UTAH PUBLIC HEALTH ASSOCIATION S. E. Gilchrist, 105 South State St., Salt Lake City, Utah.	To be announced
VIRGINIA PUBLIC HEALTH ASSOCIATION B. B. Bagby, M.D., Pres., 1302 Avondale Avenue, Richmond.	To be announced
WEST VIRGINIA PUBLIC HEALTH ASSOCIATION Dorothea Campbell, State Department of Health, Charleston.	To be announced
SOUTHERN BRANCH, A.P.H.A. P. E. Blackerby, M.D., 559 Sunnyside Drive, Louisville, Ky.	To be announced
WESTERN BRANCH, A.P.H.A. W. Ford Higby, 45 Second Street, San Francisco, Calif.	Denver, Colo., June 24–26

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DIPHTHERIA STUDIES

made by the

SUB-COMMITTEE ON DIPHTHERIA

of the

COMMITTEE ON EVALUATION OF ADMINISTRATIVE PRACTICES

Sub-Committee on Diphtheria

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AMERICAN PUBLIC HEALTH ASSOCIATION
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CONTENTS

Introduction

THREE years ago a few so-called advisers and experts were invited to attend a meeting at Battle Creek, Mich. It is very fitting to take this opportunity of formally thanking the W. K. Kellogg Foundation for the financial aid which it has so generously given. These advisers were asked to propose certain studies in various fields, including that of diphtheria, which might be profitably undertaken.

At that time the practices in the administration of diphtheria prophylactics for active immunization in this country were far from uniform. Studies had been in progress in Toronto for a few years on a modest scale to assess the antitoxin response in children to various preparations of toxoid variously used. It seemed an excellent opportunity to carry out a similar scheme on a more comprehensive scale. In the State of Michigan, consequently, a well controlled experiment of suitable magnitude was undertaken. It was proposed to compare the antitoxin response in children to 2 doses of fluid toxoid, 3 doses of fluid toxoid, and 1 dose alum precipitated toxoid. Later the investigation was extended to include 2 doses of alum precipitated toxoid.

I shall not have time to review this phase of the work in the detail which it merits. Certain requirements were essential. The environment must be free of diphtheria and attested to by carefully conducted and extensive carrier surveys. The children must have no detectable (less than 1/1,000 unit) antitoxin, at the time of the first injection; blood samples must be obtained at stated intervals thereafter. The results of this carefully executed but not completed piece of work have been fully reported by Dr. Bunney and Dr. Volk.

Your committee from the outset clearly appreciated the limitations of that study. On the one hand the relative superiority of one antigen, used in a particular way, over another was clearly demonstrated. However, to translate these findings into recommendations for administrative practice is quite another matter. The much more important question of how effective in a given community is such and such a method in the prevention of diphtheria, remained and remains unanswered. Only carefully controlled epidemiological studies carried out for a long period of time under field conditions can give the answer. Consequently other projects were initiated. The committee was fortunately able to call upon outstanding epidemiologists and other experts to guide us and assist in the work. Some of their reports will be presented here.

I should like in the brief time at my disposal to stress certain aspects of diphtheria about which we know very little. I trust my colleagues will make that clear in the report of their work which follows.

In a diphtheria environment the natural process of immunization goes on, on a large scale, through infection with the diphtheria bacillus. A few children manifest clinical diphtheria and very few succumb; the majority of those infected with the diphtheria bacillus remain presumably symptomless. Nothing is known of the most useful kind of protection or immunity, if one may use the term in this loose manner. We come back to that hardy perennial—Is it the seed or the soil that plays the dominant

rôle? Is the acquisition of antitoxin the result of one infection or of many? Is it produced quickly or slowly? How long does the carrier state last? Are carriers readily and surely detectable by the means at our disposal?

What level of antitoxin is sufficient to protect against diphtheria? Is it the Schick level, 1/250 unit? Is it much less, say 1/1,000 unit? Is it 1/100 unit? Does the immunity mechanism once attuned by a previous diphtheria experience, naturally or artificially acquired, respond rapidly enough to ward off a clinical attack sometimes, generally, or always? Why do some children given what one considers an adequate dosage of antigen contract diphtheria? Have they never responded? Has their antitoxin level dropped to the point where antitoxin is no longer adequate for protection? Why does the antitoxin level in artificially immunized children invariably drop and in contrast remain relatively constant in those "naturally" immunized?

I believe some of these questions will be answered through the results of the studies already undertaken and those proposed provided they are long enough pursued.

D. T. FRASER, M.B., D.P.H.

Foreword

CONTROL of communicable diseases depends increasingly upon knowledge of the prevalence and whereabouts of carriers and of the distribution of immunes and susceptibles in the population, as well as upon the reporting of recognized and suspected cases of a particular infection.

Lack of any reasonably adequate biological survey of pathogenic bacteria such as we have for many of the fauna and flora of our continent has forced those concerned with further refinements in the administrative control of diphtheria to seek for evidence as to the regional uniformity or variance in the distribution and type of *Corynebacterium diphtheriae* as a prerequisite for wise policies and methods of active immunization of children in the United States.

The studies presented by the several authors of the symposium were undertaken at the request of the Committee on Evaluation of the Committee on Administrative Practice to make a year's study in their respective state or city populations of carriers and the immunity status among school children. Uniformity of procedures, methods, materials, and technics was agreed upon and all carrier cultures were submitted to a central laboratory for determination of type and cultural and other characteristics.

Quite apart from, and in addition to, the accumulation of new information of a necessary and highly reliable type, this coöperative undertaking has revealed some of the possibilities of interchange of experience and the methodical cultivation of parallel but widely scattered natural phenomena accessible chiefly if not solely through local and state health departments.

It is the intention of the collaborating authors of this symposium to broaden their field of experience to include Colorado, Washington, and California, and extend their observations over at least one more year, so that a base line or status quo in the biological sense may be drawn for purposes of comparison in later years.

So much service and devotion was applied to this study by the staffs of the various divisions and laboratories of health departments and universities concerned that relatively small supplementary funds were called for to meet expenses not properly chargeable to the resources of the respective agencies. Such sums as were required were made available through the budget of the Committee on Administrative Practice from grants made for this purpose by the W. K. Kellogg Foundation.

It is the plan of the Committee on Evaluation to encourage and within its means to assist the development of similar collaboration among health departments for the solution of the many other problems where administrative efficiency awaits more precise scientific evidence as to methods and results.

HAVEN EMERSON, M.D.

A Schick Test and Diphtheria Carrier Survey of White School Children in Virginia

WILLIAM GROSSMANN, M.D.

Director, Bureau of Communicable Diseases, State Department of Health, Richmond, Va.

IN coöperation with the Diphtheria Sub-Committee of the Committee on Evaluation of Administrative Health Practices, and with financial assistance from this body, a study to determine the incidence of *Corynebacterium diphtheriae* carriers and the immunity status of white children in Virginia was undertaken. In view of the peculiar local variations which occur in diphtheria, as well as the many known factors which influence the prevalence of this disease, and the development of naturally acquired immunity against it, the difficulty of obtaining a representative sample of the school population of a state the size of Virginia is obvious. The study was planned, however, to include areas which are believed to represent fairly typical examples of geographical, economic, and environmental differences, which might be expected to influence the results of such an investigation. Sixteen schools within 6 counties and 5 schools within 2 cities were selected for the survey.

Richmond, the largest city and capital of the state, with a population of 184,900, is the commercial center of Virginia. Norfolk, the second largest city, with a population of 129,710, is one of the leading ports on the Atlantic Seaboard. Arlington County, with a population of 50,000 and an area of 31 sq. miles, consists principally of suburban homes. It is situated adjacent to Washington, D. C., on the Potomac River. Fairfax County, with a population of 32,000 and an area of 416 sq. miles, is a progressive dairy, fruit, and trucking county, located in the northern border of middle Virginia adjacent to Arlington. There is free intercommunication in the county and there has been extensive consolidation of the public schools. Hanover, with a population of 17,009 and an area of 512 sq. miles, is strictly an agricultural county. It is located about 15 miles from Richmond and comprises parts of the middle and tidewater provinces of the state. Improved county roads have left few isolated sections in this area. Prince George County, with a population of 23,311 and an area of 294 sq. miles, is a typical county of the peanut belt in the tidewater province. Intercommunication is considerably more limited than the areas previously mentioned, though few isolated sections are to be found. An industrial city of 13,000 population was not included in the study. Pittsylvania County, with a population of 61,500 and an area of 1,015 sq. miles, is located in the south central part of the state, bordering North Carolina. It is in the tobacco and cotton section. Relatively isolated sections exist in this

county and intercommunication is considerably limited. Pulaski County, with a population of 20,700 and an area of 333 sq. miles, lies in the Great Valley of Southwest Virginia, between the Blue Ridge and Appalachian Ranges. One town with a population of 7,168 which was excluded from the study is the only semblance to urban life in the county. The rest of the area is strictly rural, and many isolated mountainous and valley sections are to be found.

Nose and throat cultures were obtained from 3,773 children in these areas. Schick tests were also performed on 2,329 of these same individuals. Of the number cultured, 1,444 either did not receive a Schick test or were absent on the day the tests were read, and their immunity status, therefore, remains unknown. Likewise, 116 individuals received a Schick test, but were not cultured or their cultures were eliminated from the study because of various accidents and errors attendant upon their examination in the laboratory. Thus a total of 2,329 individuals received both a Schick test and nose and throat culture, 1,444 a culture only, and 116 received Schick test only, giving a total of 3,773 individuals cultured, and 2,445 Schick tested. These observations were carried out from October 18, 1937, through February 28, 1938, and from October 17, 1938, through April 4, 1939.

METHODS

Two sterile swabs were used for obtaining material for culture from each child; one for the tonsillar crypts or fossae, and the other passed to the nasopharynx or as near the nasopharynx as the individual would permit. Both swabs were kept together in a sterile tube and stroked on Loeffler's medium within 3 hours after swabbing. The procedure of pure culture identification of *Corynebacterium diphtheriae* using cystine-tellurite media as outlined by the referee on bacteriological methods, Dr. Martin Frobisher, Jr., was followed. Each lot of plating media was tested before use by plating the routine diagnostic swabs received in the laboratory of the Virginia Department of Health and also by plating stock cultures of *Corynebacterium diphtheriae*. Suspicious as well as typical colonies appearing on the cystine-tellurite plating media were transferred to Loeffler's slants. Organisms which resembled *Corynebacterium diphtheriae* morphologically on this media and which gave the characteristic reactions of fermenting dextrose, but not saccharose, were identified as positive cultures. These were tested for virulence by inoculating 0.2 cc. of a 72 hour broth culture intracutaneously in the ventral skin of guinea pigs. Those reacting with redness, swelling, and necrosis in 48 hours were classified as virulent; those with no reaction or the minimal reaction characteristic of needle trauma were considered avirulent.

The Schick tests were administered on the same day that cultures were obtained. A standard toxin supplied by The Connaught Laboratories of Toronto was used in these tests. All tests were read on the 7th day with the exception of 36 which were read on the 8th. The reactions to both the toxin and the heated toxin (also supplied by The Connaught Laboratories) used as a control were measured in millimeters in the horizontal and perpendicular diameters. The test was considered positive if a definite reaction characterized by discoloration, either with or without induration and scaling, was observed at the site of the toxin inoculation and no reaction was observed at the site of the control (heated toxin). The test was also considered positive if reactions to both the toxin and the control were observed and one or both diameters of the toxin reaction exceeded the corresponding diameter of the control reaction by as much as 3 mm. or more. In

TABLE 1

Reactions to Schick Test of 2,445 White School Children in Virginia, According to History of Previous Inoculation against Diphtheria, 1937–1939

Age Group, Years	History of Previous Inoculation against Diphtheria: Number Tested	Schick-negative: Number	Schick-negative: Per cent	No History of Previous Inoculation against Diphtheria: Number Tested	Schick-negative: Number	Schick-negative: Per cent	Total: Number Tested	Schick-negative: Number	Schick-negative: Per cent
0– 4	6	2	33.3	2	1	50.0	8	3	37.5
5– 9	614	416	67.8	541	300	55.4	1,155	716	62.0
10–14	777	650	83.6	428	278	65.0	1,205	928	77.0
15 and older	43	38	88.4	25	19	76.0	68	57	83.8
Age not recorded	2	0	0.0	7	2	28.6	9	2	22.2
Total	1,442	1,106	76.7	1,003	600	59.8	2,445	1,706	69.8

a very few instances, where the reactions to both toxin and control were of equal and large size and definite scaling was present over the area of the toxin, but not observed over the control site, the test was classified as positive.

Inquiry was made of each individual in regard to previous inoculation against diphtheria and previous Schick status and the information recorded. Verification by health department and school records and other sources was obtained wherever possible.

RESULTS OF SCHICK TESTS

The Schick reactions of the 2,445 children tested in this study are shown in Table 1. Those from whom a history of previous inoculation against diphtheria was obtained, either with or without definite records to substantiate such claims, are included in the previously inoculated group. Those giving no history of previous inoculation, as well as a smaller number relating an unknown or questionable history, in regard to immunizing treatments, are classified in this table as uninoculated. Any attempt further to classify the inoculated group, according to kind of immunizing agent, the number of inoculations received, or the interval of time between inoculation and the present testing, results in too few observations for each such category to be of significance. Thus in the inoculated group are included all those who, either by history or by record, have been given some kind of immunizing treatment against diphtheria at some time prior to the present investigation. Approximately 70 per cent of all children tested gave negative reactions to the Schick test, 77 per cent of those previously inoculated,

TABLE 2

Reactions to Schick Test of 1,886 White School Children in Hanover, Prince George, and Pulaski Counties and the City of Norfolk, Virginia, According to History or Record of Previous Inoculation against Diphtheria, 1937–1938

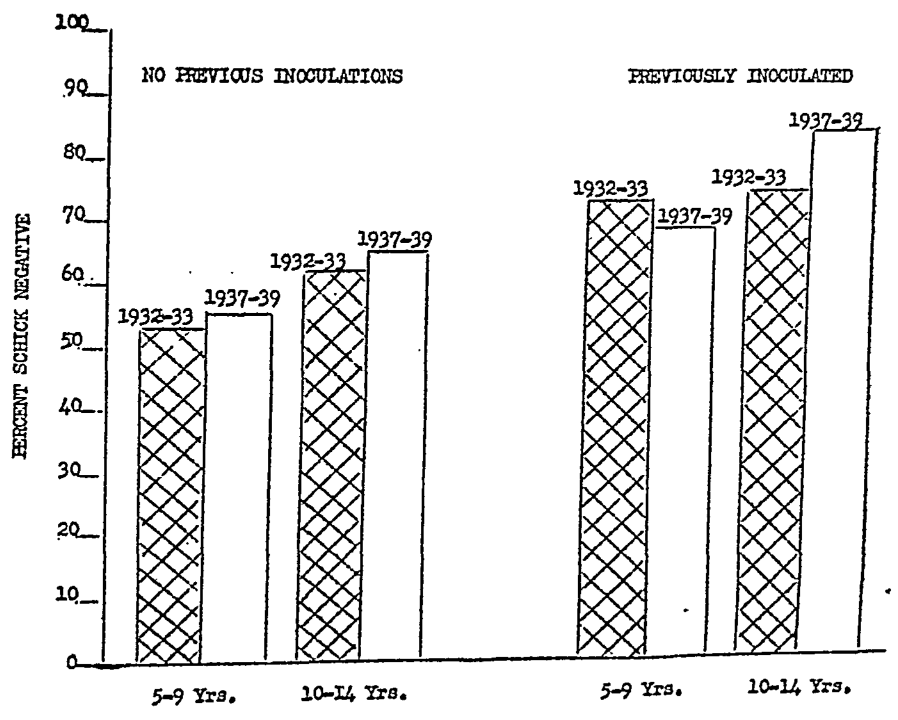
Age Group, Years	Previously Immunized or Inoculated: Record of Inoculation and Neg. Post-Schick: Number Tested	Schick Neg.: No.	Schick Neg.: %	Record of Inoculation No Post-Schick Record: Number Tested	Schick Neg.: No.	Schick Neg.: %	History of Inoculation No Record: Number Tested	Schick Neg.: No.	Schick Neg.: %	No Previous Inoculation: No History of Previous Inoculation: Number Tested	Schick Neg.: No.	Schick Neg.: %	Inoculation History Unknown or Indefinite: Number Tested	Schick Neg.: No.	Schick Neg.: %
5– 9	81	73	90.1	90	70	77.8	288	201	69.8	351	177	50.4	74	52	70.3
10–14	244	225	92.2	99	91	91.9	279	231	82.8	225	154	68.4	95	62	65.3
15 and older	11	11	100.0	2	2	100.0	24	21	87.5	12	9	75.0	11	9	81.8
Total	336	309	92.0	191	163	85.3	591	453	76.6	588	340	57.8	180	123	68.3

and 60 per cent of those uninoculated. The percentage of Schick-negatives by age groups in each classification is shown.

That the classification adopted in regard to previous artificial immunization experience underrates the frequency with which immunity is promoted by such procedures, may be seen in Table 2, which shows the reactions to the Schick test of 1,886 children on whom more accurate information as to previous inoculations was obtained from health department and school records. Among the previously inoculated group, the frequency of Schick-negatives is greatest for those known to have been rendered Schick-negative by previous inoculation (92 per cent), and lowest in the group having no record of immunizing treatment (76.5 per cent). Of those known by record to have been inoculated, but having no subsequent Schick test, 84.9 per cent were found to be negative in this study. It is, also, of interest that among the uninoculated group a higher percentage of Schick-negative reactions was observed in those who gave questionable or unknown histories in regard to previous immunizing treatments (68 per cent) than in the group definitely stating that they had received no previous inoculations (58 per cent).

It is interesting to compare the results of the Schick reactions of this study with those of McGinnes and Stebbins in Virginia in 1932 and 1933.[1] In their investigation they Schick tested approximately 10,000 white school children in 5 counties, 2 of which were also included in the present survey. Schick test toxin obtained from a commercial biological house was used in their work and it is stated in their report that a control of heated toxin was used in 3,000 of the tests. In 1932–1933 approximately 30 per cent of the children studied had received some kind of immunizing treatment prior to testing, the majority of such treatments being toxin-antitoxin though a few had received fluid toxoid. In the present investigation approxi-

FIGURE 1—Comparison of Schick Reaction in White School Children in Virginia in 1932–1933 and 1937–1939



mately 55 per cent had previously been inoculated, the majority of such inoculations, which could be definitely classified as to kind, were alum precipitated toxoid. A comparison of the Schick reactions in the 1932–1933 study of McGinnes and Stebbins with the 1937–1939 study is shown in Table 3 and graphically in Figure 1. Remarkably close agreement among the previously uninoculated children in both the age group 5–9 years and the 10–14 year group may be seen. For the 5–9 year group, 54 per cent were found Schick-negative in 1932–1933 and 55 per cent in 1937–1939. In the 10–14 year group, 62 per cent and 65 per cent were Schick-negative in the two respective studies. It would appear, therefore, that *there has been no appreciable change in the rate of development of naturally acquired immunity against diphtheria in Virginia between the times of the two respective studies.*

group. In regard to the children giving a history of previous inoculation, however, no such agreement was found. In the age group 5–9 years, McGinnes and Stebbins found 73 per cent Schick-negative, and the 1937–1939 study showed 68 per cent negative. This difference proves to be greater than one would expect from chance variation alone in samples the size of those represented by the two studies ($x/\sigma = 2.3$). In the age group 10–14 years 75 per cent were found to be Schick-negative in 1932–1933 and 84 per cent in 1937–1939. This difference is likewise statistically significant ($x/\sigma = 5.08$).

In evaluating the differences observed in the previously inoculated groups, due consideration must be given certain possible variables which may have resulted in these differences being more apparent than real. The fact that control tests were not used on all of the observations in the study of McGinnes and Stebbins would result in the inclusion of a certain number of false positives in their results and thus in an unmeasurable degree influence the comparison attempted. Differences in exactness of classification in regard to previous inoculation status, clearly demonstrated in Table 2 for this study, would also influence a true comparison. Likewise, the recognized variance of different Schick toxins in their reaction properties could materially affect the observed results. Whatever

TABLE 3

*Reactions to Schick Tests of White School Children in Virginia in 1932–1933 * and in 1937–1939, According to Status of Previous Inoculation against Diphtheria*

	No Previous Inoculation						*Previously Inoculated*					
	Number Tested		*Schick-negative*				*Number Tested*		*Schick-negative*			
			Number		*Per cent*				*Number*		*Per cent*	
Age Group	*1932–1933*	*1937–1939*	*1932–1933*	*1937–1939*	*1932–1933*	*1937–1939*	*1932–1933*	*1937–1939*	*1932–1933*	*1937–1939*	*1932–1933*	*1937–1939*
5–9 years	2,459	541	1,317	300	53.6	55.5	1,916	614	743	416	73.1	67.8
10–14 years	1,827	428	1,139	278	62.3	65.0	2,057	777	1,534	650	74.6	83.7

* McGinnes, G. F., and Stebbins, E. L. *A.J.P.H.*, 24, 4 (Apr.), 1934.

The fact that one large urban area * was included in the present study and that rural areas exclusively were surveyed in 1932–1933, does not materially affect the comparison since on analysis it was found that inclusion of the city tended to lower rather than raise the percentage of Schick-negative reactions among individuals in the uninoculated

* Norfolk City included in Schick survey. Norfolk and Richmond included in earlier survey of present study.

TABLE 4

Results of Bacteriological Examinations of Nose and Throat Cultures for C. Diphtheriae from 3,773 White School Children in Virginia, 1937–1939, According to Certain Age Groups

Age Group, Years	Number Cultured	Number Positive for C. Diphtheriae: Avirulent Strain, Number	Avirulent Strain, Per cent	Virulent Strain, Number	Virulent Strain, Per cent
0– 4	2	0	0.0	0	0.0
5– 9	1,912	23	1.2	11	0.6
10–14	1,673	17	1.0	6	0.4
15 and older	151	0	0.0	0	0.0
Unknown	35	0	0.0	0	0.0
Total	3,773	40	1.1	17	0.5

error may arise from individual differences in the administration and interpretation of the tests, however, may be considered relatively constant and the same for both of these investigations, since the greater majority of the tests and readings in each were performed by the same individual (G. F. McGinnes). Therefore, though we are inclined to believe that an actual difference does exist between the results of the two studies, particularly in the age group 10–14 years, since the information concerning their previous inoculation was more reliable and more often confirmed by records, we would hesitate to draw any definite conclusions in this regard.

RESULTS OF BACTERIOLOGICAL EXAMINATIONS OF NOSE AND THROAT CULTURES

The results of the pure culture identification of *Corynebacterium diphtheriae* from nose and throat swabs from the 3,773 children studied, according to certain age groups, are shown in Table 4. The rate of carriers of virulent organisms was found to be *0.5 per cent for the total study and for avirulent strains 1.1 per cent.* There is no appreciable difference between the two age groups 5–9 and 10–14 years. There was, likewise, rather close uniformity in the rate of carriers detected in the 1937–1938 season and in 1938–1939. In the first named period a rate of 0.5 per cent for virulent strains and 1.2 per cent for avirulent strains and for the 1938–1939 period 0.4 per cent virulent, and 0.9 per cent avirulent. Unfortunately, there are no comparable studies of carrier incidence previously performed in Virginia with which to compare the present findings.

Table 5 shows the results of cultures from 2,329 children according to Schick reaction at the time the nose and throat swabs were taken. It can be seen that 12 of the 13 virulent strains of *Corynebacterium diphtheriae* were found in Schick-negative individuals, resulting in a virulent carrier rate approximately 5 times as great as that observed in Schick-positive children. These findings are in accord with the observations of others. Because of the small number of observations of the study, however,

TABLE 5

Results of Bacteriological Examinations of Nose and Throat Cultures for C. Diphtheriae from 2,329 White School Children in Virginia, According to Schick Reaction at Time of Taking Culture

Schick Reaction at Time of Taking Culture	Number Cultured	Number Showing Positive Culture for C. Diphtheriae: Avirulent Strain, Number	Avirulent Strain, Per cent	Virulent Strain, Number	Virulent Strain, Per cent
Negative	1,677	20	1.19	12	0.72
Positive	652	10	1.53	1	0.15
Total	2,329	30	1.29	13	0.56

TABLE 6

Summary of Schick Test and Diphtheria Carrier Survey in Virginia, 1937–1939

County or City	Schick Reactions: Previously Inoculated: Number Tested	Per cent Negative	No Previous Inoculation: Number Tested	Per cent Negative	Per cent Inoculated Prior to Study	Results of Cultures for C. Diphtheriae: Number Cultured	Number Positive: Avir.: No.	%	Vir.: No.	%	Dates of Taking Cultures	Diphtheria Morbidity Rates *: Aver. 1933–1937	1937	1938	Diphtheria Mortality Rates *: Aver. 1933–1937	1937	1938
Hanover	314	89.2	202	68.8	61	532	9	1.7	0	0.0	Oct. 18 to Nov. 8, 1937	85.8	17.6	23.5	4.7	0.0	0.0
Prince George	301	85.6	138	65.2	72	514	9	1.8	3	0.6	Jan. 31 to Feb. 28, 1938	30.0	12.9	38.6	0.9	0.0	0.0
Pulaski	286	76.6	196	62.8	59	515	3	0.6	7	1.4	Nov. 12 to 23, 1937	101.4	222.2	231.9	6.8	9.7	14.5
Norfolk City	159	73.6	232	47.8	41	419	3	0.7	0	0.0	Dec. 10, 1937	18.5	13.1	18.5	1.1	0.0	2.3
Arlington	184	33.2	136	56.6	58	190	0	0.0	1	0.5	Oct. 17, 1938	23.6	4.0	16.0	0.0	0.0	0.0
Pittsylvania	138	87.0	99	60.6	58	243	7	2.9	2	0.8	Nov. 7, 1938	73.8	37.4	167.5	3.3	0.0	6.5
Fairfax	...	....	...	....	..	500	0	0.0	0	0.0	Mar. 30 to Apr. 4, 1939	33.8	9.4	37.5	2.5	0.0	0.0
Richmond City	...	....	...	....	..	860	9	1.1	4	0.5	Dec. 9 to 20, 1938	30.2	14.1	22.2	2.1	1.1	1.1
Total	1,442	76.7	1,003	59.8	55	3,773	40	1.1	17	0.5	State of Virginia	66.7	52.5	72.6	5.6	3.6	4.9

* Rate: per 100,000 population

TABLE 7

Results of Titrations for Diphtheria Antitoxin of 124 Blood Sera Obtained from White School Children in Virginia, According to Age and Schick Reaction at Time of Bleeding

	Blood > 1/100 Unit Antitoxin				*Blood < 1/100 Unit Antitoxin*			
Age Group, Years	*Schick-negative*	*Doubtful Schick-negative*	*Schick-positive*	*Doubtful Schick-positive*	*Schick-negative*	*Doubtful Schick-negative*	*Schick-positive*	*Doubtful Schick-positive*
5–9	19	1	0	1	0	0	5	0
10–14	66	1	3	3	0	1	17	1
15 and older	4	0	2	0	0	0	0	0
Total	89	2	5	4	0	1	22	1
	91		9		1		23	

there may be an error attributable to the small sample ($x/\sigma = 1.66$). There is no appreciable difference in the rates for avirulent carriers between Schick-positive and Schick-negative children.

Table 6 presents a brief summary of the results of the Schick tests and culture identifications of this study and includes the recorded diphtheria morbidity and mortality rates for each area included in the survey. No attempt has been made to correlate the findings nor does such a correlation appear evident. It is interesting, however, that the rate of virulent carriers was found to be highest in the two areas (Pulaski and Pittsylvania) which experienced the highest attack rate and mortality from diphtheria during the year in which they were studied.

Table 7 shows the results of titrations of diphtheria antitoxin in blood sera obtained from 124 children in this study at the time of administering the Schick tests. Blood samples were collected in sterile Kimble tubes, the serum drawn off under aseptic conditions and stored at 46° F. without preservative until testing was performed 6 to 8 months later. The titrations were performed only at the 1/100 unit level since it was not intended to establish any high degree of correlation between the two observations but rather to serve as a rough check on the immunity status as measured by the Schick test toxin used in the investigation. The toxin used in the titration experiments was supplied by Dr. Martin Frobisher, Jr., and contained 65 Lr per cc. This toxin gave a satisfactory reaction in guinea pigs when diluted 1:650 with a standard antitoxin (6 units per cc.) diluted 1:600. In Table 7 Schick reactions which have been classified as doubtful are those which could conceivably have been interpreted as positive or negative by other observers, but which were considered as definitely one or the other in this study, e.g., doubtful Schick-positives were called positives.

It can be seen from the figures presented that, though agreement between the two types of observations was lacking in 9 per cent of the instances where the blood sera contained more than 1/100 unit of antitoxin, there is, nevertheless, as close a correlation as one might expect from single observations of titrations performed at one level only. From these findings it would appear that whatever error may exist in regard to the Schick toxin used in the study, would be toward the safety of the individual concerned in the interpretation of his immunity status by this test, since the reaction may occasionally appear positive although the individual had more than 1/100 unit of antitoxin.

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Diphtheria Infection and Morbidity in Cleveland, 1937-1939*

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FOLLOWING a period of high mortality, unprecedented in the statistical record and exceeding 300 per 100,000 in 1877, the decline of diphtheria in Cleveland was heralded by a precipitate fall in the death rate in 1879. After 5 years at a level of about 180, a gradual decline commenced, which continued, with some interruptions, to 1909, when the rate was 12.4. In the succeeding 18 years, with the exception of 1924, higher rates were experienced. Then, after 1927, the decline was resumed and greatly accelerated. Since 1930 mortality has been at a very low level. In 1938 the rate was only 0.5, a reduction of 97 per cent from that of 1927.

The number of cases reported in each year, since 1910, has varied directly with the number of deaths. Thus there has been no evidence of decreasing severity of the disease. The case fatality was 7.6 per cent for the period 1910-1914; 7.9 for 1915–1919; 8.2 for 1920–1924; 7.2 for 1925–1929; 7.0 for 1930–1934, and 8.5 for 1935–1938. The great reduction in morbidity may be illustrated further by the fact that, in 1927, 2,872 cases were reported and, in 1938, only 77.

With the possible exception of the more or less constant case fatality rates, a closely similar diphtheria history might be presented for most large cities in the United States and indeed for most areas of the United States and Europe for which adequate records have been kept. The great decline in mortality, the early date at which it was manifested, and the widespread area over which it has been experienced, all go to indicate that it is attributable largely to causes other than specific treatment and immunization. The remarkable reduction in morbidity and mortality since 1927, if viewed as a separate phenomenon, might be attributed in part at least to artificial immunization. That this has been a major factor, however, would seem to be quite improbable, as the recent acceleration of the decline has likewise been experienced over a wide area and, even in many cities in which immunization has been most extensively practised, the reduction has been far greater than can be satisfactorily explained by the numbers of persons immunized. Viewing all the available facts, the conclusion seems inevitable that other factors have played a major rôle.

* The studies on which this *report* is based received financial support from the Committee on Administrative Practice of the American Public Health Association. Carrier and Schick testing surveys were made with the assistance of Dr. Joyce I. Hartman, Chief Medical Officer of the Cleveland Board of Education, and his staff. Data on prevalence and mortality were furnished by Dr. H. J. Knapp, Commissioner of Health, and Dr. R. J. Ochsner, Chief of the Bureau of Child Hygiene, Cleveland Division of Health. For advice and assistance on bacteriological aspects, the authors are especially indebted to Dr. Martin Frobisher, Jr

From a theoretical point of view, variations in the prevalence of infectious diseases, which cannot be accounted for by known inequalities of exposure, must be explained by concomitant changes in human resistance or by changes in virulence of the specific microörganisms. And while such explanations belong at present to the realm of speculation, diphtheria more than any other human disease offers opportunity for study of certain fundamental facts necessary for any rational theory. Reasonably adequate statistics of morbidity and mortality are available; the frequency of infection can be determined rapidly and economically for large population groups; and at least the minimal frequency of immune persons may be determined by the application of the Schick test. Other desirable measures are lacking both as regards the characteristics of the microörganism and the detection of immunity other than antitoxic. There is, however, a paucity of data respecting those facts which are readily gathered, and it is especially regrettable that so little is known regarding the frequency of carriers and the progress of natural immunization during periods of low prevalence.

For these reasons efforts were made in 1937–1938, and were repeated in 1938–1939, to determine as exactly as possible the frequency of diphtheria carriers among school children of the Cleveland public schools. In 1938–1939, a large number of school children were also Schick tested. The technical procedures in both studies, including methods of isolation and identification of *Corynebacterium diphtheriae* and the use of a standard toxin in Schick testing, were those approved by the Diphtheria Sub-committee of the Committee on Administrative Practice. It is hoped that the methods and results of each of these surveys may be published later in detail. The present report is an attempt to synthesize data relating to infection, morbidity and immunity. Two important questions will be discussed:

1. The current quantitative relationship between carrier infection and clinical diphtheria.
2. The incidence of carrier infection in relation to the rate of acquirement of antitoxic immunity.

1. THE CURRENT RATIO OF INFECTION TO DISEASE

One of the points of greatest interest in diphtheria is the quantitative relationship which exists between the number of demonstrable carriers and the number of cases of clinical diphtheria. During the two academic years included in the survey, 4,720 children of ages from 5 to 14 years, inclusive, were examined bacteriologically, nose and throat swabs being made from each child. The children were so selected that those examined in each month may be considered to be fairly representative of the school population. In the year 1937–1938, the period included the months of October to May, inclusive, and, in the following year, the months of November to May, inclusive. Approximately the same results were found in the corresponding months of each year. The highest incidence was in November, and no carriers were found among 1,695 children examined in the months of March, April and May. The results for those months in which carriers were discovered are shown in Table 1.

TABLE 1

Results of Bacteriological Examination of White School Children in Cleveland, Aged 5–14 Years, Inclusive, for the Months in Which Diphtheria Carriers Were Found, 1937–1938 and 1938–1939, Combined

		Carriers Found	
Month	*No. Examined*	*No.*	*Per cent*
October	375	2	0.53
November	882	10	1.13
December	399	3	0.75
January	692	1	....
February	677	1	....
Total	3,025	17	0.56

The percentages given in Table 1 indicate only the proportions of children who were demonstrated to be harboring toxigenic *Corynebacterium diphtheriae* at a given time. For comparison with the incidence of diphtheria it is necessary to estimate the number infected each day, each week, or each month. In making such a calculation certain assumptions are necessary. It must be assumed that infection occurs more or less at random in the population concerned. Also some estimate must be made of the probable duration of the carrier state, as this is not known for casual carriers with any exactness. In making a similar calculation Frost [1] assumed that the observations of Hartley and Martin [2] on convalescent carriers might be applied, and our calculations have been made on the same basis. From the equation for the curve representing the disappearance of bacilli, as given by these authors, the proportion of remaining carriers becoming negative in each 24 hour period was found to be 5.16 per cent. Hence to maintain any given rate of infection an equal proportion must become carriers each day. Thus in any month the total number of carriers would be approximately 1½ times those demonstrable on a single day.*

These calculations were made for each month in which carriers were found, that is, from October to March. The estimated numbers of children becoming carriers in each month and the average number per month for the 5 month period are shown in Table 2, with the corresponding average diphtheria incidence for children of the same age group.

TABLE 2

Comparison between Estimates of Carrier Infections and the Incidence of Diphtheria, for Cleveland Children, Aged 5 to 14 Years, 1937–1939

Period Included (Averages of 2 Years)	*Incidence per 100,000*		*Ratio Carrier Incidence: Case Incidence*
	Carrier Infections	*Clinical Diphtheria* *	
October	820	0.35	.....
November	1,730	2.43	712:1
December	1,100	2.43	453:1
January	210	2.43	.....
February	210	0.35	.....
Monthly average	890	1.67	533:1

* Estimated population Jan. 1, 1938, 144,000.

The results of this calculation are very remarkable. Apparently more than 500 carrier infections occurred, on the average, in each month, to each attack of diphtheria. This is a very different result from that obtained by Frost,[1] in his study of the Baltimore data for 1921–1922, who estimated that there were about 47 carriers to each case of diphtheria, for children aged 5 to 14 years. For comparison, our tabulations have been arranged in the same manner as those of Frost. Even if it were considered that the methods of carrier detection are twice as efficient today as in the earlier period, the present estimates would indicate 4 or 5 times as

* The formula for the data of Hartley and Martin, as derived by Greenwood, is log Y = 2.6002 — 0.0218 X. If y1 and y2, respectively, represent the numbers of persons carrying *C. diphtheria* on 2 successive days, then log y1/y2 = 0.0218, and y1/y2 = 1.0516.

From our data for October, therefore, to maintain a carrier rate of .53 per cent through the month, the percentages of the population becoming carriers each day would be .0053 × .0516, or .0002735. This is *p*, the daily infection rate, and *q*, or the chance of not being infected in a day, is .9997265. The chance of being infected at least once in the month is $1 - q^{30}$, or .0082, which is approximately 1½ times the observed rate. Similar calculations were made for each month. The mean monthly carrier incidence (Table 2) is based on *p* = .0056 × .0516.

many carriers per case as were observed in Baltimore.

Unfortunately, no studies of carrier infection or of diphtheria immunity have been made previously on a representative sample of Cleveland school children. In 1921–1922, the reported incidence of diphtheria was about the same as in Baltimore. It is almost inconceivable that, had a carrier survey been made at that time, it would have revealed an infection rate of only one-fourth or one-fifth that observed in Baltimore. The conclusion seems justifiable therefore that a great increase in the ratio of carrier infections to clinical attacks has occurred in Cleveland.

Since clinical diphtheria occurs almost exclusively in Schick-positive individuals, a more enlightening comparison would embrace only this class. This is especially desirable if ratios of the present day are to be compared with those of a period in which active immunization was not so extensively practised. There are few observations on the relative liability of Schick-positive and Schick-negative children to infection, and the assumption of a more or less random distribution of carriers must be retained in making such calculation. Carrido-Morales and Costa-Mandry [3] found a somewhat higher frequency of carriers of toxigenic *Corynebacterium diphtheriae* in Schick-positives than in Schick-negatives, but the numbers of children included were relatively small. In the Cleveland studies direct observations were not made on this phase as it was considered essential that the carrier study should include as nearly as possible a representative sample of school children and, as noted below, this was not possible in the Schick testing. All Schick tested children might have been examined bacteriologically but resources and facilities did not permit undertaking this additional task. On checking the files for both series it was found that 4 of 17 carriers had been Schick tested. Three, whose discovery antedated Schick testing by about 1 year, were negative. The fourth had been tested on October 19, 1938, and found positive; on December 6, that is, 1½ months later, he was found to be a carrier.

More than 7,000 children were Schick tested in October and November, 1938, with the standard toxin. Since parental consent was necessary, and since it is probable that a larger percentage of parents of children previously immunized consented than of others, it is probable that the sample is heavily overweighted with children who have received active immunization. Of children aged 5 to 14 years, 35.6 per cent were found to be Schick-positive, a figure which is more likely to be lower than higher than would be found in a representative sample.

If the comparison of carriers to cases be restricted to the class of Schick-positives, on the assumptions mentioned, the average monthly attack rate is raised from 1.67 per 100,000 to 4.7 and the ratio consequently reduced to approximately 190:1 That is, among Schick-positives of ages from 5 to 14 years, nearly 200 infections are estimated for each case of diphtheria.

For a section of Baltimore, Frost, Frobisher, Van Volkenburgh, and Levin [4] have compared the carrier incidence in 1921–1922 and in 1934–1936 with the estimated annual attack rates for Schick-positive children in approximately the same periods. The incidence of carriers in the later period was found to be 44 per cent of the incidence in the earlier, but the estimated attack rate for Schick-positives in 1933–1936 was only 15 per cent of that for 1921–1924. Apparently, therefore, in 1933–1936, a given number of infections of Schick-positive children, aged 5–14, produced only about one-third as many cases of diphtheria as in 1921–1924.

It is probable that the methods of

isolation used in the present study reveal at least 50 per cent more carriers than the methods used in Baltimore in the two surveys mentioned (Frobisher and Van Volkenburgh [5]). If the proportions found infected in Baltimore be increased to this extent, a rough comparison may be made between the first and second Baltimore surveys and that in Cleveland with respect to the ratio of infection to disease in Schick-positive children.

Following the same procedure as that used by Frost, *et al.*[4] it was estimated that, in Cleveland in 1937–1939, a given number of infections of Schick-positive children produced only about one-fourth as many cases as in Baltimore in 1921–1924, and about three-fourths as many as in Baltimore in 1933–1936. In making these approximations, the carrier percentages for children aged 5–14 years were assumed to be as follows: Baltimore, 1921–1922, 3.66; Baltimore, 1933–1936, 1.62; and Cleveland, 1937–1939, 0.56. The average annual attack rates per 100,000 for Schick-positives of the same ages were, respectively, 1,383, 204, and 56.

2. FREQUENCY OF INFECTION IN RELATION TO THE RATE OF NATURAL IMMUNIZATION

Some difficulty was experienced in determining the present status of antitoxic immunity in children not previously immunized. Names and addresses of all children tested were checked against the records of the Board of Education and of the Division of Health to learn whether or not toxin-antitoxin, toxoid, or alum precipitated toxoid had been previously administered. More than 2,000 homes were then visited to learn of possible unrecorded immunization, performed either by private physicians in Cleveland or elsewhere, or by health departments in places of former residence. Omitting all for whom the history is still unknown, and also omitting all who are known to have had a Schick test without subsequent immunization, there remain 982 children, the results of whose tests are given in Table 3.

TABLE 3

Results of Schick Test with Standard Toxin for Cleveland School Children Not Previously Immunized Nor Schick Tested, October and November, 1938

Age	*Total Tested*	*Positive*	*Per cent Positive*
5 years	164	144	87.8
6 "	137	115	83.9
7 "	49	41	83.6
8 "	40	34	85.0
9 "	90	71	78.8
10 "	96	73	76.0
11 "	115	89	77.3
12 "	142	103	72.5
13 "	84 *	57	67.8
14 "	43	28	65.1
15 "	22	14	63.6
Total	982	769	78.3

* One additional child had a doubtful reaction.

It appears that only about one-third of the children of the Cleveland public schools, not previously immunized, have acquired a negative Schick test before the age of 15 years. Comparison of these results with those of an earlier period is not possible; at least we have been unable to find any records of previous Schick testing of non-immunized children which permit a valid comparison. It is considered, however, from such information as is available, that the proportion giving a negative test at this age was higher 10 to 15 years ago, and such a conclusion is in conformity with the findings in other large cities at that time.

The most interesting question is perhaps not the absolute status of the children but the rate at which antitoxic immunization has been occurring in recent years. From the figures of Table 3, 22.7 per cent of children acquired immunity between the ages of 5 and 14 years, an annual increment of 2.52 per cent. This is much lower than the corresponding average annual increment as given in the Baltimore statistics for 1921–1924, which was 4.24 per cent.[6]

The incidence of carriers of toxigenic

diphtheria bacilli in Baltimore, in the winter of 1921–1922, was found to be 2.44 per cent for children of these ages. As above noted, this figure should be raised to about 3.66 per cent, at least, for comparison with the Cleveland findings in 1937–1939 (0.56 per cent).

If there is a direct relationship between the incidence of carrier infection and the rate of increase of natural antitoxic immunity, the annual increment of Schick-negatives would be expected to be much lower than 2.52 per cent, on the basis of the Baltimore studies of 1921–1924. This may be shown in the following manner.

Let X = expected proportion becoming negative annually

Then 2.44 : 0.56 : : 4.24 : X. X = 0.97 per cent

Or, increasing the percentages of carriers found in Baltimore by 50 per cent:

3.66 : 0.56 : : 4.24 : X. X = 0.65 per cent

The results of these comparisons may be interpreted as indicating that any stated number of infections in Cleveland in 1937–1939 produced 2.6 times (i.e., $\frac{2.52}{0.97}$) as many immunizations as in Baltimore in 1921–1924. The ratio is even higher in the second calculation.

This may also be demonstrated by a somewhat different method. It is not known whether there occurs any significant variation in the ratio of carriers to cases at different seasons. Assuming that the ratio does not vary significantly, Frost estimated that the annual incidence of carriers among children of from 5 to 14 years was approximately 25 per cent (2,538 per 10,000), or 47 times the annual morbidity rate. Applying the same method to the Cleveland statistics, the proportion of children of these ages who became carriers in each of the years under consideration would be 10.7 per cent, this being 533 times the average morbidity rate for the years 1937 and 1938 (20 per 100,000).

From these estimates of carrier prevalence and from the average annual increment in Schick-negatives, an estimate may be made of the number of carrier infections necessary, on the average, to produce sufficient antitoxin to give a negative Schick test. These ratios, for Baltimore and for Cleveland, are given in Table 4.

Although too much weight should not be placed on comparisons which are admittedly based on inadequate data, it is of interest that the number of infections required to produce a negative Schick test in Cleveland as computed by both these methods, was at least not greater and was probably much less than in Baltimore. If this conclusion could be substantiated, it would mean that, in ability to stimulate antitoxin production, *Corynebacterium diphtheriae* has been just as effective in recent years as in a period of much higher prevalence and mortality. If there has been a loss of pathogenicity there has apparently been no associated loss of antigenicity. This conclusion gains some support from the fact that the strains isolated from carriers in recent times are, as a rule, good producers of toxin.

TABLE 4

Estimated Number of Carrier Infections Necessary to Produce a Negative Schick Test, for Children Aged 5–14 Years

Locality and Period	Annual Rates per 100,000: Carrier Incidence	Annual Rates per 100,000: Increment of Schick-negatives	Ratio Carriers to New Negatives
Baltimore, 1921–1923 *	38,070	4,240	9.0:1
Baltimore, 1921–1923 †	25,380	4,240	6.0:1
Cleveland, 1937–1939	10,660	2,520	4.2:1

* Based on 1½ times reported carrier incidence

† Based on reported carrier incidence

SUMMARY AND DISCUSSION

The decline in diphtheria mortality in Cleveland which commenced about 60 years ago was greatly accelerated after 1927, with the result that the city is now experiencing the lowest death rates in its recorded history. Concerning morbidity, the older statistics are not so reliable; since 1927, there has been a remarkable reduction, corresponding closely to that in mortality.

The explanation of the recent acceleration in the decline of both mortality and morbidity is by no means obvious. Although it corresponds roughly with the more extensive practice of active immunization, both death rates and morbidity rates have fallen more rapidly and to a much lower figure than would be expected from the estimated proportion of the population which was immunized, unless there is a very substantial indirect result from immunization. The decline, however, has not been peculiar to Cleveland but has occurred in many other areas in this country and in Europe. Viewed from the broader angle it is more likely that causes other than immunization have been a significant factor.

A study of the frequency of carriers of toxigenic *Corynebacterium diphtheriae* was carried out in Cleveland during the academic years 1937–1938 and 1938–1939. This study revealed a carrier incidence of 0.56 per cent for children of ages from 5 to 14 years, for the months October to February, inclusive. No carriers were discovered in March, April, or May.

Application of the Schick test to children of the same ages, in October and November, 1938, revealed an average incidence of negatives of 36.5 per cent. It is probable that the sample tested included a higher proportion of immunized children than is true of the general population of the same ages.

For the 5 months in which carriers were found, the estimated ratio of carrier infections to clinical attacks is 533:1. This is remarkably high in comparison with the ratio for Baltimore for 1921–1922, which Frost estimated to be about 47:1 for children of the same ages. Even if present bacteriological methods are twice as efficient as those of that time, it appears that there were in Cleveland in 1937–1939, at least 4 or 5 times as many infections per case as in Baltimore in 1921–1922.

In comparing the present day with a period in which active immunization was little practised, it is more enlightening to consider only the Schick-positive population. Assuming that carrier infection is as frequent in this class as in negatives and also that all or almost all clinical attacks occur among Schick-positive individuals, the ratio of infection to attacks in this class is estimated as about 190:1. Estimates have been made of the relative number of infections of Schick-positive children which have resulted in disease in Cleveland in 1937–1939, as compared with two periods in Baltimore for which similar statistics were available. The results of these comparisons indicate that any given number of infections of Schick-positive children, aged 5 to 14 years, in Cleveland, resulted in only one-fourth as many clinical attacks as in Baltimore in 1921–1924, and in about three-fourths as many attacks as resulted in Baltimore in 1933–1936.

Examination of the recent diphtheria experience of Baltimore shows close agreement with that of Cleveland. In the absence of any representative statistics for Cleveland relating to carrier infection and Schick testing for an earlier period, caution must be used in interpretation. It is, however, probable that there has been a considerable increase in the ratio of infection to disease in Schick-positive children in Cleveland. Lacking further evidence we cannot do better than to quote the conclusions reached by Frost, *et al.*[4] following an

illuminating comparison of the periods 1921–1924 and 1933–1936 in Baltimore:

> One of the three changes tending to reduce morbidity, the decreased proportion of Schick-positives, may reasonably be attributed directly and fully to artificial immunization. The other two more important factors concerned in the reduction of morbidity, namely, diminished infection-frequency and smaller ratio of cases to infections, are not related in any obvious way to artificial immunization. Nor does it seem probable that they are, to any considerable extent, the result of environmental changes which would tend to reduce the opportunities for transfer of infection from person to person. It seems more reasonable to regard them as the result of natural forces operating either to increase some factor of human resistance not indicated by the Schick test, or to produce some change in the quality of the diphtheria bacillus, tending to reduce both its infectivity and its pathogenicity. Or, it may be that both human resistance and bacteriological quality have changed, and perhaps not independently, each reacting on the other.

There is another interesting feature. From the results of the Schick test on Cleveland children who have never received toxin-antitoxin, toxoid, or alum precipitated toxoid, the annual increment of Schick-negatives in recent years was found to average 2.52 per cent per year for children aged 5–14 years. Calculations are given, which must be considered as only rough approximations, showing the numerical relationship of carrier infections to immunization as evidenced by negative Schick tests, the ratio being about 4 or 5 to 1. Applying the same arithmetical method to the Baltimore statistics for 1921–1923, it is found that the number of infections for each new negative was certainly not less and apparently considerably higher. The conclusion is reached, therefore, and it should be supported by further studies, that if there has been a loss in pathogenicity on the part of *Corynebacterium diphtheriae,* there has been no associated loss in antigenicity.

It is difficult to find unequivocal data relating to the maintenance of immunizing qualities, associated with loss of virulence, in the field of bacterial diseases. For the viruses, two observations may be mentioned, one old and one of recent date. There is little doubt that the virus of variola, after passage through the calf, is almost as effective an antigen as formerly, although its capacity to produce disease in man is greatly diminished. Findlay,[7] and Lloyd, Theiler and Ricci [8] have reported similar findings with the virus of yellow fever, with resultant preparation and extensive use of yellow fever vaccine. The latter workers, after prolonged cultivation in chick embryo tissue from which the central nervous system had been removed, found the virus to have greatly diminished neurotropism and viscerotropism but to have retained its antigenic properties. In each of these instances, change in the virus has been accomplished only after prolonged growth in the tissues of another species.

In conclusion, a plea is made for continuation and intensification of studies on diphtheria, both in the field and in the laboratory. With the great decline in prevalence and mortality there may be a corresponding decline in interest on the part of health officers and epidemiologists. This would be most unfortunate as many of the problems remain unsolved, some of which appear to be common to a considerable number of infectious diseases.

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Schick Tests and Carrier Surveys in White School Children, Alabama, 1937-1938

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THE diphtheria picture as regards incidence, susceptibility, and carrier status is not uniform throughout the United States. For several years the number of cases of diphtheria reported has been greatest in the southern states, and it is not felt that this excess morbidity has been due primarily to lack of immunization, but rather to other factors concerned in the spread. Alabama, as a representative southern state, has had an annual average of 1,172 cases of diphtheria reported during the 5 years, 1934–1938, or an annual rate of 4.1 per 10,000 population.

The present study was undertaken to determine two factors concerned in the spread of this disease: (1) the immunity status of white school children as measured by the Schick test, (2) the prevalence of carriers of virulent diphtheria organisms in this same population. White school children of grammar school age, 5–14, were selected for study, and geographical areas typical of the state were used in the study.

The Schick testing was conducted by the author throughout, using standard toxin prepared by the Connaught Laboratories, with heated toxin used as a control. The tests were read on the 7th day and interpreted as positive, negative, or pseudo reactions. The culturing was done by taking one swab from the nose and one from the throat and planting both immediately on a single tube of Loeffler's medium. These cultures were returned to the laboratory the same day and after incubation over night were transferred to cystine-tellurite-blood agar plates. After 48 hours' incubation on the tellurite media the cultures were examined and from 3 to 6 diphtheria-like colonies were picked from each plate and transferred again to Loeffler's medium. After 18 to 24 hours' incubation of these Loeffler's slants, smears were made for microscopic examination and all cultures showing diphtheria-like organisms were transplanted to dextrose and saccharose broths. Those reacting on sugars as *Corynebacterium diphtheriae* were transferred again to broth cultures for virulence tests. Rabbits were used for the virulence tests following Fraser's technic.

All cultures showing typical morphology and giving typical reactions on dextrose and saccharose, whether virulent or non-virulent, were sent to Dr. Martin Frobisher at Baltimore for confirmation. The figures used are based on his findings.

The study was carried out during two school years, October, 1937, to February, 1938, and October, 1938, to December, 1938. In the first year's work the Schick testing was done on school children in Perry and Conecuh Counties and the rural schools of Mont-

gomery County. The culturing was done on schools of Lee, Chilton, and Marshall Counties, with a sample from the suburban schools of Birmingham. The group examined in the fall of 1938 were in Randolph and Shelby Counties and the same individuals were used for both tests. Histories as to previous immunization were obtained and were checked through the records of the schools and the county health departments. There are some possible errors in listing children as not previously immunized who may have had an immunizing agent, but the numbers are not large.

Tables 1 to 4 show the results.

TABLE 1

Schick Tests on White School Children, Alabama, 1937–1938

	No History of Previous Immunization			*History of Previous Immunization*		
Age	*Schick-positive*	*Schick-negative*	*Per cent Schick-negative*	*Schick-positive*	*Schick-negative*	*Per cent Schick-negative*
6	61	195	76.1	10	121	92.4
7	42	280	87.0	12	132	91.7
8	41	321	88.7	10	126	92.6
9	48	323	87.1	5	130	96.3
10	34	335	90.8	2	126	98.4
11	23	309	93.1	7	120	94.5
12	17	240	93.4	1	60	98.4
13	5	118	95.9	1	35	97.2
14	4	68	94.4	0	6	100.0
15	2	44	95.7	0	8	100.0
Total	277	2,233	89.0	48	864	94.7

TABLE 2

Results of Bacteriological Examinations of Nose and Throat Cultures for Corynebacterium Diphtheriae, Alabama, 1937–1938

	Number Examined	*Number Negative*	*Number Avirulent*	*Per cent Avirulent*	*Number Virulent*	*Per cent Virulent*
Oct. 1937–Jan. 1938	3,499	3,404	80	2.29	15	0.43
Oct. 1938–Dec. 1938	1,800	1,692	77	4.27	31	1.72
Totals	5,299	5,096	157	2.96	46	0.87

TABLE 3

Results of Bacteriological Examinations of Nose and Throat Cultures for Corynebacterium Diphtheriae According to Schick Status, Alabama, 1938

Schick	*Number Examined*	*Number Negative*	*Per cent Negative*	*Number Avirulent*	*Per cent Avirulent*	*Number Virulent*	*Per cent Virulent*
Negative	1,448	1,359	93.8	66	4.5	23	1.6
Positive	174	167	96.0	5	2.9	2	1.1
Doubtful	36	35	97.2	0	0.0	1	2.8
Absent for Reading	142	131	92.2	6	4.2	5	3.5
Totals	1,800	1,692	94.0	77	4.3	31	1.7

TABLE 4

Results of Bacteriological Examinations of Nose and Throat Cultures for Corynebacterium Diphtheriae According to Age, Alabama, 1937–1938

Age	*Number Examined*	*Number Negative*	*Per cent Negative*	*Number Avirulent*	*Per cent Avirulent*	*Number Virulent*	*Per cent Virulent*
0- 4	23	23	100.0	0	0	0	0
5- 9	2,879	2,753	95.6	93	3.2	33	1.1
10-14	2,349	2,273	96.8	64	2.7	12	0.5
15 +	48	47	97.9	0	0.0	1	2.1
Totals	5,299	5,096	96.17	157	2.96	46	0.87

The striking observation regarding Schick testing is the high percentage of immunes regardless of whether the child had received an artificial immunizing agent or not. From age 7 and above, few Schick-positive children were seen. By the time a child had been in school a year, natural immunity had developed in a very high percentage. This would seem to indicate that these children are being exposed to diphtheria organisms.

The tables on the results of nose and throat cultures reveal a rather high carrier rate, particularly in the group examined in the fall of 1938. These figures were obtained from a single nose and throat culture and represent minimum findings. Repeated culturing would undoubtedly raise the number of carriers of virulent organisms found. It is interesting to note that 2 children with positive Schick tests were harboring virulent organisms without any evidence of illness. The age group 5–9 showed twice as high a carrier rate as the older children, 10–14.

SUMMARY

Eighty-nine per cent of 2,510 white school children without a history of previous immunization were Schick-negative.

Ninety-four and seven-tenths per cent of 912 white school children with a history of artificial immunization were Schick-negative.

Forty-six carriers of virulent diphtheria, or 0.87 per cent, were isolated in the examination of 5,299 nose and throat cultures and an additional 157 carriers of non-virulent diphtheria organisms, or 2.96 per cent, were found in the same group.

Cultures taken during October to December, 1938, revealed 1.7 per cent virulent carriers and 4.3 per cent avirulent carriers from 1,800 examinations.

Strains of C. Diphtheriae in Various Parts of the United States

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MANY public health administrators look upon the control of diphtheria as a problem which has been solved. Effective therapeutic antitoxin to prevent deaths, and satisfactory immunization procedures to prevent cases, are available at costs within the reach of all. The disease has been rapidly declining, and has even disappeared from many communities for several years. It is often assumed that if present efforts are maintained, the future may be faced with confidence.

With this view there can, in general, be no serious disagreement, but it is entirely possible that the future is not quite so assured, at least in some parts of the world, as it seems to be. Diphtheria epidemics of a fulminating nature which seem to progress regardless of immunity, as measured and controlled at present, are not uncommon. The famous outbreak at Leeds,[9] in which strains of diphtheria bacilli possessed of certain definite cultural characters (and designated as *Corynebacterium diphtheriae* gravis) were shown to be the inciting agent, is a case in point. There are numerous descriptions of other similar outbreaks in the literature due to the gravis and other types, and some of those reading this article have doubtless had personal experience with this sort of diphtheria outbreak. It is conceivable that the various types of diphtheria organisms responsible for these epidemics might spread more widely throughout the country and eventually create a situation of real gravity.

In view of these possibilities, the present study was undertaken for the purpose of collecting data concerning the distribution of different biological types of *Corynebacterium diphtheriae* and their fluctuations from year to year, and eventually ascertaining, if possible, their relation to diphtheria morbidity and mortality and the process of natural immunization.

The investigation was initiated in 1937, following several years of study of diphtheria morbidity and carrier rates in Baltimore,[1,2] and determinations of the biological characteristics of the organisms isolated there. The investigations described in this report are a continuation of the foregoing, extended to various parts of the United States. Specifically, attempts were made, to determine the following points:

1. Are there any cultural or biological characteristics of *Corynebacterium diphtheriae* which can be correlated with special virulence for rodents or human beings?
2. Do biological differences exist between different strains of diphtheria bacilli obtained from different localities, and do these characters change from time to time?
3. What are the carrier rates with respect to both virulent and avirulent organisms and different cultural types in different places, and what is their relation to time, locality, and rates of natural immunization?
4. May changing trends in biological types

be so correlated with morbidity rates, natural immunity status, etc., as to be of value as guides in the administrative control of diphtheria?

METHODS

Since results obtained in various laboratories form a part of the basis of this report, every effort was made in the laboratories involved to maintain as high a degree of uniformity in all phases of the work as possible. The field and laboratory procedures initially adopted for the carrier surveys in Baltimore, and described elsewhere [1, 2] were followed rather closely. For details, the reader is referred to the literature cited. In addition to the pure cultures isolated at the local laboratories following this technic, some surveys were made by rubbing the nose and throat swabs on Loeffler slants in the field or local laboratory, incubating the slants there, and then shipping them by air express to Baltimore where the cultures were plated and pure cultures of *Corynebacterium diphtheriae* obtained. The latter method proved remarkably satisfactory and in only one or two instances was there any difficulty, usually occasioned by bad flying weather.

Every pure culture was studied, as heretofore, according to a uniform method by the writer only, or under his immediate supervision by Dr. Elizabeth Parsons. In this manner, the personal factor in the comparison of cultures has continued at a minimum throughout.

RESULTS

It is unusual to obtain a direct and unqualified answer from Nature except by such crude questionings as placing the hand on a hot stove. However, in the present instance, an apparently unqualified answer to the first of the questions in our list has been obtained. As seen in Table 1, by comparing the data in columns 1, 2, and 5, it is quite evident that no significant correlation exists between cultural characters *(as demonstrated by the methods described)* and virulence *(as demonstrated by guinea pig and rabbit tests)*. As judged by these methods, the "gravis"* type of organism (in the time and areas studied) is frequently avirulent. When virulent, it is frequently present in the absence of disease and when present in disease, the case is frequently mild.

The possibility should be emphasized, however, that under other circumstances, for example under natural conditions *(as opposed to laboratory cultures and rodent tests)*, a definite correlation may exist between cultural types and diphtheria epidemiology. Certain field data suggest that the prevalence of "gravis" types may be directly associated with increased morbidity. For instance, the gravis type of *Corynebacterium diphtheriae* is common and has been definitely on the increase (at least in the last year) in Virginia and Alabama but not in the North (Table 1, col. 2). The striking *prevalence* of gravis strains, and particularly the increasing prevalence of *virulent* gravis strains this year in Alabama (Table 3) seems significant in view of the low prevalence or entire absence of these organisms in the North; especially when it is borne in mind that death rates in the North as a whole have declined greatly in the past decade while those in the South have, in many places, decreased much less extensively and rapidly.[6]

Although many avirulent gravis strains have been found, the type may not always have been so mild or so

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* As pointed out in a previous paper [3] the definition of "gravis" is almost as varied and manifold as the names of diphtheriologists. The term as used here corresponds as closely as possible under the circumstances to the original description of the Leeds workers. However, in this discussion, it refers to a group of cultural characters and has *no relation to virulence*. That is, organisms having all the cultural characters of *Corynebacterium diphtheriae* gravis may or may not be virulent *as tested in the laboratory* and many virulent and avirulent gravis strains have been isolated in the surveys at present under discussion. The same considerations apply to the term *Corynebacterium diphtheriae* mitis.

TABLE 1

Characteristics of Organisms Found in Various Places in 1937–1938 and 1938–1939[1]

	Mitis and Mitis-like (1)		*Gravis and Gravis-like* (2)		*Virulent* (3)		*Dissociating*[3] (4)		*Total*[4] (5)	
	1937–1938	*1938–1939*	*1937–1938*	*1938–1939*	*1937–1938*	*1938–1939*	*1937–1938*	*1938–1939*	*1937–1938*	*1938–1939*
Alabama	66	37	10	45	18	28	19	60	90	104
Shelby	..	74	..	7	..	23	..	44	..	43
Randolph	..	10	..	72	..	31	..	72	..	61
Virginia	94	12	0	64	26	18	9	29	34	17
Cleveland	100	85	0	5[2]	25	35	15	85	28	20
Michigan	91	79	0	0	27	18	45	89	11	19
Kingston	100	81	0	3.5[2]	29	0	71	63	14	27
Ossining	..	76	..	0	..	12	..	88	..	17

[1] Figures give per cent of total cultures received
[2] Based on one culture only
[3] Dissociating (unstable) cultures
[4] Total cultures of C. diphtheriae received.

restricted in its habitat as we find it at present. It seems almost certain that some strains of *Corynebacterium diphtheriae* are susceptible, at times, of a tremendous exaltation of aggressiveness or dispersiveness. The enhancement of virulence does not seem to be manifested in the usual animal tests and may not always be accompanied by *gravis* cultural characters (starch fermentation, etc.), but it seems to occur most readily in strains possessing these characters. This enhancement of virulence seems to convert them into extraordinarily dangerous parasites not hampered by immunity as we ordinarily measure it. Such strains were involved in the Leeds outbreak and form the basis of the original description of the gravis type of diphtheria bacilli. Thus, while a high gravis carrier rate is obviously not in itself necessarily dangerous, if gravis strains are most susceptible of sudden great enhancements of virulence, their increasing prevalence in any community may constitute a potential menace.

As a possible illustration of the growth of such a menace in a population, we may consider some details of case-culture studies carried on as a supplement to these surveys. For example, in the Eastern Health District of Baltimore, the organisms isolated from clinical cases of diphtheria have for the past 6 years been predominantly of the mitis or mitis-like type; only 2 or 3 gravis-like strains having been encountered during that time. Diphtheria morbidity and mortality have been low. Similarly, in Rochester, N. Y., and Cleveland, Ohio, case cultures have been entirely mitis or mitis-like. In Virginia, on the contrary, an institutional outbreak in 1937–1938 consisted entirely of gravis-like cultures (7 cases studied). In that year, the carrier cultures in the general population were predominantly of the mitis-like type (94 per cent) (Table 1, col. 1). This year, however, we find that 17 per cent of case cultures (not institutional cases) and *64 per cent of carrier cultures* are of the gravis-like type (Table 1, col. 2). One wonders whether Virginia is about to be visited by diphtheria of an enhanced degree of malignancy or dispersiveness. Morbidity data show a definite increase for 1938–1939 in some sections.

Turning from these interesting speculations to the second of our listed questions, we again find a clear-cut answer. It is quite evident, as shown in Table 1, that marked differences do, indeed, exist between diphtheria organisms found in different localities and, more interesting still, that they change radically from year to year. Attention is called espe-

cially to changes in ratio of gravis to mitis types (cols. 1 and 2), ratio of virulent to avirulent cultures (col. 5), and fluctuations in the stability of the flora as measured by the number of " dissociating " strains. The latter are strains which, when plated out on McLeod's medium, exhibit several different colony types, the variant colonies in subculture often having very different biological characters from the parent strains (although practically always resembling them in virulence or avirulence). Cultures from one locality may be distinguished by the fact that very few " dissociate " in this manner, those from another source being very prone to vary or " dissociate " and constituting an " unstable diphtheria flora." So well defined are these and other differences in organisms from different parts of the country that it was often found possible for the experienced worker to state the source of a group of cultures from the information gained by a study of their properties. For example, it was quite evident to the laboratory workers in Baltimore when the survey in Alabama changed from Shelby to Randolph County although they had no information concerning it.

Aside from the purely bacteriological interest attached to these findings, which will be discussed in a later paper, they may have a fundamental epidemiological significance. The study of so apparently obscure a point, for example, as the dissociation of cultures may be of value. Thus, it is noted that there is a marked increase in the number of " dissociating strains " in Alabama, Virginia, and Michigan in 1939 over 1938. Correlated with this in Alabama and Virginia we find a tendency to change in the direction of increased numbers of gravis and gravis-like cultures in 1939 over 1938, and a trend in Michigan away from the mitis type toward the gravis by way of increased numbers of the indeterminate or intermediate type (not shown in the tables). In Ohio, and Kingston, N. Y., a similar tendency is shown although the figures for the latter places are too small to be of any immediate significance. In addition to this, considerable changes in the ratio of virulent to avirulent cultures (or vice versa) are seen from year to year in nearly all of the areas studied. It is possible that investigations of the nature and extent of the " dissociations " (or instability) occurring in the carrier flora, as well as the cultural types present, may furnish a guide or warning to the health officer as to future changes in virulence or dispersiveness. One phenomenon may precede another by a year or more. It has already been indicated that the measurement of gravis carrier rates in a community could serve as a guide to the accumulation of a flora which, there is reason to believe, may be peculiarly susceptible to enhancement of virulence: a potential menace.

Again turning to our list of questions, we find with respect to the third, that, as seen in Table 2, markedly different carrier rates were found in different places (col. 1), not only at a given time but at different times in a given place.

Considerable differences in rates of natural immunization were also found (col. 4).

These various rates are of especial interest in respect to the number of *avirulent* organisms isolated during the carrier surveys (col. 2). A rôle for these avirulent organisms in the epidemiology of diphtheria has long been sought, but no satisfactory place for them has been found so far. Doull[3] showed that familial exposure of susceptible children to carriers of avirulent organisms resulted in a higher attack rate among the exposed than occurred in non-exposed (10 as compared with 3 or 1). Chason[4] showed that a high rate of natural immunization (92 per cent at 10 years of

TABLE 2

Comparison of Carrier Rates, Natural Immunity and Types of Organisms in Various Places in 1937–1938 and 1938–1939

Locality	Children Found to Be Virulent Carriers (1)		Children Found to Be Avirulent Carriers (2)		Per cent of Cultures Avirulent (3)		Naturally Immune (4)		Morbidity Rate (5)	
	1937–1938	1938–1939	1937–1938	1938–1939	1937–1938	1938–1939	1937–1938	1938–1939	1937–1938	1938–1939
Alabama	0.45	1.5	2.1	3.9	82	72	89 [2]	85 [2]	4.0 [3]	7.0 [4]
Shelby	....	1.0	...	3.3	..	77	..	95 [2]	7.5	5.4
Randolph	....	2.1	...	4.7	..	69	..	78 [2]	3.0	8.6
Virginia	0.5	0.4	1.2	0.9	73.6	82.3	53 [5]	60 [6]	66.4 [5]	16.0 [5]
Ohio	0.24	0.33	0.72	0.95	75	65	..	17	7.4	7.8
Michigan	0.21	0.10	0.21	0.18	73	82	20 [8]	20 [1, 8]	0.05 [1]	0.05 [1]
Kingston	0.28	0.00	0.67	1.55	71.4	100	33 [2]	18 [1, 2]	3.5	3.5
Ossining	....	0.18	....	0.15	....	88	..	32 [2]	7.1	41.5

1. Estimated
2. Age groups 0–1.
3. Average of rates for Lee, Chilton, and Marshall counties cultured in 1937
4. Average of rates for Shelby and Randolph counties cultured in 1938
5. Prince George, Hanover, and Pulaski counties and Norfolk city cultured in 1937–1938.
6. Arlington county cultured in 1938–1939
7. Figures are for the calendar years 1937 and 1938; not 1937–1938 and 1938–1939
8. Figures derived for the whole study 1936–1937. Ninety-one per cent of the children were under 10.

age) existed in parts of rural Alabama; yet it was found that a great majority (5.6:1) of the organisms prevalent in nearby parts of rural Alabama were avirulent. Doull, *et al.*, showed likewise that a large percentage of persons (about 80 per cent) 6 months to 15 years of age in Rio de Janeiro were negative to the Schick test, yet artificial immunization is not carried out routinely there, and clinical diphtheria is a rarity. Unfortunately, we have no applicable diphtheria carrier rates, virulent or avirulent, for Rio de Janeiro.

In the present study, although the data on natural immunity are incomplete, some suggestive relationships seem to have been brought to light. For example, it was shown last year, and it is amply confirmed this year, that there are definitely higher virulent carrier rates in the South than in the North, at least as illustrated by New York and Alabama. Inequality is also found, but to a greater degree, in *avirulent* carrier rates and, in a general way, in natural immunity statuses. In one community (Kingston, N. Y.), in 1938–1939, no virulent organisms were found in a survey of over 1,700 children; a virulent carrier rate of 0.0. Yet among children under 10 the natural immunity rate (i.e., per cent of children found Schick-negative and who gave no history of active immunization, natural or artificial) is estimated at about 18 per cent on the basis of previous figures. Curiously enough, the *avirulent* carrier rate was 1.55. The suggestion is obvious that, even when all, or nearly all, virulent strains are removed from a community a certain minimal rate of natural immunization may be maintained by the so-called avirulent flora present in that community. Some of the natural immunity now present may possibly result from infections which occurred at a time previous to the present study. However, for the last decade, the morbidity rate in Kingston has been very little higher than it is now.

In Alabama we find an avirulent carrier rate of nearly 4 per cent for the entire survey and nearly 5 per cent in Randolph County. Of the rural children under 10, 80 to 95 per cent are naturally immune. Morbidity rates are considerably higher than in Kingston, however, and so are virulent carrier rates. The question may be raised,

nevertheless, whether these are sufficient to account for the observed natural immunity. Are the organisms which are now regarded as avirulent (on the basis of guinea pig and rabbit tests) wholly avirulent for man? May not some of them possess some low degrees of virulence not detected by the usual tests? May the supposedly avirulent (or very slightly virulent) organism constitute a "silent" immunizing mechanism, less active perhaps than fully virulent organisms, but still active? Even though wholly avirulent may they not, in their living state and natural host, contain a more or less efficient immunogen (for human beings) independent of any demonstrable toxigenic properties? No answer to these queries is available at the present time, but the possible basic importance of the "avirulent" organisms in diphtheria epidemiology suggests itself more and more strongly as the problem is investigated.

Attention is directed to one other point which seems of interest. It will be noted that in Alabama, Virginia, and Ohio there is a certain amount of agreement between fluctuations in virulent and avirulent carrier rates (Chart 1), in that when one rises the other rises; when one falls the other falls. This reminds one of the observation of Doull and Fales [7] that, in Baltimore in 1922–1923, virulent and avirulent diphtheria bacillus carriers corresponded in seasonal variations. In the years and areas covered by the present study, however, dissimilarities are noted in the rapidities with which the two kinds of organisms vary in prevalence. For example, in Chart 1 * it is seen that, in Alabama, both virulent and avirulent carrier rates increased between the surveys of 1937 and 1938 at virtually the same rapidities, these being indicated by the slope of the lines in Chart 1 (had there been no change the lines would have remained horizontal). In Ohio, both have likewise increased, but the avirulent carriers have increased at a distinctly more rapid pace than the virulent carriers. In Virginia, both virulent and avirulent carriers have decreased, but the avirulent carriers appear more reluctant to withdraw than the virulent. Kingston presents a striking contrast. The avirulent carrier rate has risen rapidly (0.67 to 1.55) while the virulent carrier rate has dropped from 0.28 to 0.0. The discrepancy between the two is clearly shown in Chart 1.

Coupled with these differences in rapidity with which carrier rates change, are the alterations in ratio of avirulent organisms to the total diphtheria flora of the respective communities (Table 2, col. 3). For example, in Alabama, although the avirulent diphtheria carrier rate has increased more rapidly than the virulent carrier rate, as shown by the steeper slope of the broken line in Chart 1 (0.45 to 1.55), it has not increased as *much* as the virulent carrier rate (2.1 to 3.9) and, as a result, the proportion of avirulent organisms among all those collected in Alabama has decreased (82 per cent to 72 per cent) relative to the virulent. The same general type of change has occurred in Ohio, while the reverse has occurred in Virginia where the virulent organisms have decreased, leaving the seemingly more tenacious or prolific or "dispersive" avirulent organisms behind in an increased proportion of the total.

One hesitates to suggest an interpretation of these observations, based as they are on a number of relatively small figures and on surveys made in not exactly identical seasons. One hypothesis suggests itself if we momentarily assume as a fact what Doull suggested in 1930 as a possibility, that "avirulent bacilli are at times the ancestors or descendants

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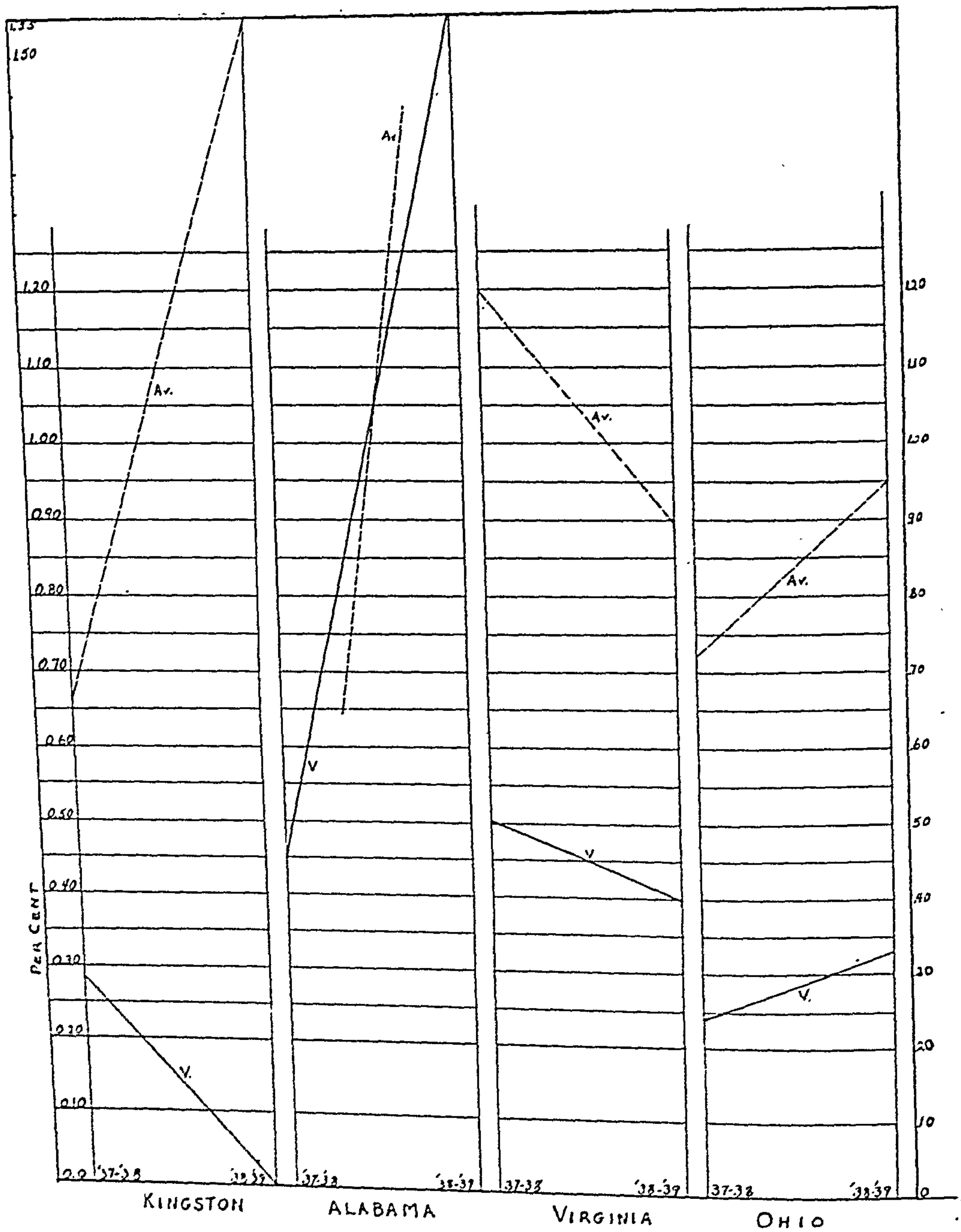
* In this chart, it is not intended to show trends, but merely to compare rates of change by the slopes of the lines connecting the data for 2 successive surveys.

CHART 1—Virulent Carrier Rates and Avirulent Carrier Rates in Four Localities in Two Successive Years



of virulent organisms." One might then expect that they would vary rather closely in parallel. However, it appears that, for some reason, the factors inducing virulent bacilli to produce avirulent progeny acted slightly or not at all in some areas (Ohio and Alabama) but very vigorously in others (Kingston, N. Y., and Virginia).

It is particularly puzzling to note, in this connection, that the operations of these mysterious factors in Alabama 1937–1938, as compared with 1938–1939, are largely among the gravis and gravis-like strains. Thus, in 1937–1938 9.7 per cent of the 93 Alabama cultures were gravis and gravis-like and 11 per cent of these were virulent. In

1938–1939, 38.4 per cent of the 104 Alabama cultures were gravis and gravis-like and 30 per cent of these were virulent (Table 3).

TABLE 3

Increase in Prevalence of Gravis Strains, Especially Virulent Gravis Strains, in Alabama

Survey	*Total Cultures*	*Per cent of Cultures Found to Be Gravis*	*Per cent of Gravis Cultures Virulent*
1937–1938	93	9.7	11.0
1938–1939	104	38.4	30.0

Coming, finally, to the fourth of the questions listed at the beginning of this paper a complete answer is not yet available. It is plain enough, as already shown, that considerable changes in type and virulence of organisms and their prevalence, as well as in morbidity and natural immunity rates, have occurred in two seasons and in different places; but whether these changes represent trends which will continue in the direction indicated and thus serve as useful guides in diphtheria control remains to be seen.

The explanation of the curious phenomena related to the natural history of diphtheria uncovered by this study is admittedly obscure. It would seem of the greatest interest to continue to follow these same lines of investigation as far as possible, perhaps extending the work to other parts of the country, ever bearing in mind the fact that the utility of information about natural phenomena is not always immediately apparent and depends in large degree upon the extent of our knowledge concerning it.

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Diphtheria Immunity and Carrier Surveys in New York State

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SCHICK test surveys and carrier surveys have been carried out in two New York State cities as a part of a study of diphtheria immunity and carrier prevalence in various places in the United States and Canada, sponsored by the diphtheria sub-committee of the Committee on the Evaluation of Administrative Practices of the American Public Health Association. The procedure followed in these surveys and the method of study are the same as those carried out in the other study areas, which have previously been described in detail.

The cities selected in New York State for this study were Kingston and Ossining. Kingston is a city of approximately 30,000 population, located on the Hudson River midway between Albany and New York City. It was selected for this study for several reasons: first, because a small but carefully conducted Schick test survey had been carried out by the late Dr. F. W. Laidlaw in 1922, immediately preceding the first use of toxin-antitoxin in that city; second, because unusually complete and accurate morbidity and immunization records were available; and third, because the history of diphtheria in Kingston during the past 15 years has been in general similar to the history of this disease in many cities of similar size in the state. Unfortunately, no accurate records of earlier carrier surveys are available for comparison.

Ossining is a village of approximately 15,000 population, located in Westchester County on the lower Hudson River, and because of its proximity to New York City a part of its population is made up of commuters. It was included in this study because in general the history of diphtheria in the village had been similar to that in Kingston and the rest of the state, with the exception that a distinct increase in diphtheria morbidity occurred in 1938 immediately preceding the survey.

Table 1 shows diphtheria morbidity in Kingston and Ossining from 1908 through 1938. Diphtheria was highly prevalent in Kingston and Ossining during the period 1908 to 1920, as it was throughout the state. Beginning soon after 1920, there was a marked decrease in the incidence of the disease in both Kingston and Ossining, which was roughly parallel to the decrease in the state as a whole. No cases occurred in Kingston for the 4 year period 1933 to 1936. One case occurred in 1937 and 1 in 1938. No cases occurred in Ossining from 1930 through 1935. One case occurred in 1936, none in 1937, and 6 cases occurred just preceding the survey.

As previously stated, a Schick test survey was carried out in the public and parochial schools of Kingston in 1922. Table 2 shows the results of this survey which preceded the first artificial immunization in that area but which was carried out at a time when clinical

TABLE 1

Diphtheria Morbidity Rates per 100,000 Population in Kingston, N. Y.. and Ossining, N. Y., 1908–1938

Year	Diphtheria Morbidity Rate per 100,000 Population: Kingston	Ossining	Year	Diphtheria Morbidity Rate per 100,000 Population: Kingston	Ossining
1908	393.6	239.9	1925	81.9	26.4
1909	224.8	491.2	1926	14.2	...
1910	169.7	276.0	1927	17.8	8.1
1911	42.3	353.8	1928	21.4	31.9
1912	130.3	90.0	1929	21.4	15.3
1913	99.3	69.2	1930	3.6	30.1
1914	57.1	107.6	1931	7.1	7.4
1915	68.3	232.7	1932	7.1	22.0
1916	143.8	206.6	1933	...	....
1917	67.9	99.8	1934	...	....
1918	184.4	131.7	1935	...	....
1919	480.3	1069.7	1936	...	7.1
1920	126.8	622.1	1937	3.5	....
1921	166.2	454.6	1938	3.5	41.5
1922	153.6	153.4			
1923	50.7	102.4			
1924	82.6	18.1			

diphtheria was and had been highly prevalent. It may be noted that of 501 children who were Schick tested, 166, or 33 per cent, were Schick-negative, representing the result of natural processes of immunization. It is of interest to note that 36 per cent of the group 0–4 years of age were Schick-negative.

A Schick test survey was carried out in Kingston in March and April of 1938, in which 2,600 children were tested. It was possible to confirm history of previous immunization with unusual certainty as complete records from the earliest immunization in the city health department were available and the records of immunizations performed by practising physicians were unusually complete and accurate. Six hundred and seven children gave no history of immunization, nor was there any record of immunization of these children in the Department of Health nor from records obtained from practising physicians. While the percentage of the total number giving no history of immunization found to be Schick-negative is approximately the same as that found in 1922, it is of interest to note that natural Schick-negatives in the group of children under 10 years of age in 1938 is low as compared to findings in 1922.

TABLE 2

Kingston Schick Test Survey, 1922

Age Group	*Number Tested*	*Number Negative*	*Per cent Negative*
0– 4 years	60	22	36.7
5– 9 "	254	78	30.8
10–14 "	165	56	33.9
15 years and over	22	10	45.4
Total	501	166	33.1

A diphtheria carrier survey was carried out in Kingston beginning on January 25, and completed on March 11, 1938. This survey was carried out in the public and parochial schools; the same proportion of children was cultured in each school as the population of that school formed of the total school population of the city. An effort was also made to distribute in so far as possible the children cultured throughout the various age groups in each

TABLE 3

Schick Test Study in Kingston, N. Y., March and April, 1938
Schick Test Reactions by History of Previous Diphtheria Immunization for Certain Age Groups

Age at Time of Schick Test	History of Previous Immunization			No History of Immunization			Total		
	Number Tested	Negative Number	Negative Per cent	Number Tested	Negative Number	Negative Per cent	Number Tested	Negative Number	Negative Per cent
0– 4	17	12	70.6	15	0	0.0	32	12	37.5
5– 9	591	463	78.3	198	35	17.7	789	498	63.1
10–14	823	709	86.1	266	118	44.4	1,089	827	75.9
15 & over	552	478	86.6	109	58	53.2	661	536	81.1
Unknown	15	11	73.3	19	7	36.8	34	18	52.9
Total	1,998	1,673	83.7	607	218	35.9	2,605	1,891	72.6

school. Table 4 shows the results of the diphtheria carrier survey in Kingston in January, 1938, according to sex and age. Fifteen cultures obtained in this survey contained organisms morphologically and culturally characteristic of *Corynebacterium diphtheriae*. Only one of these strains was found to be virulent.

A second carrier survey was carried out in Kingston in the same schools during November and the first week of December, 1938. No attempt was made to culture the same individuals who were cultured in the first survey, but it was found that approximately 35 per cent of those cultured in the second survey had been cultured in the first. Table 5 shows the results of this survey. It may be noted that of the 1,742 individuals cultured, 26 were carriers of organisms morphologically and culturally characteristic of *Corynebacterium diphtheriae*, but that none of these were found to be virulent.

The same Schick testing and culturing procedures were followed in the City of Ossining. Table 6 shows the results of a Schick test survey carried out in September and November, 1938. An unusually high proportion of children had received immunizing treatment, and of the 884 tested, only 78 gave no history of previous immunization. Of the total tested who had had previous immunizing treatment, 72 per cent were found to be Schick-negative as compared with 83 per cent found Schick-negative following immunizing treat-

TABLE 4

Diphtheria Carrier Study in Kingston, N. Y., January 25–March 11, 1938
Cultures Taken According to Sex and Certain Age Groups

Age Group	Number Cultured			Number with Positive Cultures: Male		Number with Positive Cultures: Female		Number with Positive Cultures: Total		Per cent Positive Cultures: Male		Per cent Positive Cultures: Female		Per cent Positive Cultures: Total	
	Male	Female	Total	Morph. Pos.	Vir.	Morph. Pos.	Vir.	Morph. Pos.	Vir.	Morph. Pos.	Vir.	Morph. Pos.	Vir.	Morph. Pos.	Vir.
5– 9	309	333	642	2	0	1	0	3	0	0.6	..	0.3	....	0.5	....
10–14	410	364	774	8	0	4	1	12	1	2.0	..	1.1	0.27	1.6	0.13
15 & over	42	21	63	0	0	0	0	0	0	...	..	...	....	...	....
Not stated	1	1	2	0	0	0	0	0	0	...	..	...	....	...	....
Total	762	719	1,481	10	0	5	1	15	1	1.3	..	0.7	0.14	1.0	0.07

Only one strain proved virulent when tested on guinea pigs; that from a female aged 10 years.

TABLE 5

Diphtheria Carrier Study in Kingston, N. Y., October 25–December 6, 1938
Cultures Taken According to Sex and Certain Age Groups

Age Group	Number Cultured			Number with Positive Cultures: Male		Female		Total		Per cent Positive Cultures: Male		Female		Total	
	Male	Female	Total	Morph. Pos.	Vir.	Morph. Pos.	Vir.	Morph. Pos.	Vir.	Morph. Pos.	Vir.	Morph. Pos.	Vir.	Morph. Pos.	Vir.
5– 9	512	459	971	4	0	4	0	8	0	0.8	..	0.9	....	0.8	....
10–14	413	313	726	7	0	11	0	18	0	1.7	..	3.5	....	2.5	....
15 & over	28	17	45	0	0	0	0	0	0	...	..	...	....	...	....
Total	953	789	1,742	11	0	15	0	26	0	1.2	..	1.9	....	1.5	....

TABLE 6

Schick Test Study in Ossining, N. Y., September–November, 1938
Schick Test Reactions by History of Previous Diphtheria Immunization for Certain Age Groups

Age at Time of Schick Test	History of Previous Immunization: Number Tested	Negative: Number	Negative: Per cent	No History of Previous Immunization: Number Tested	Negative: Number	Negative: Per cent	Total: Number Tested	Negative: Number	Negative: Per cent
0– 4	11	3	27	0	..	..	11	3	27
5– 9	538	362	67	53	17	32	591	379	64
10–14	330	268	81	25	21	84	355	289	81
15 & over	5	5	100	0	..	..	5	5	100
Total	884	638	72	78	38	49	962	676	70

TABLE 7

Diphtheria Carrier Study in Ossining, N. Y., January–February, 1939
Cultures Taken According to Sex and Certain Age Groups

Age Group	Number Cultured			Number with Positive Cultures: Male		Female		Total		Per cent Positive Cultures: Male		Female		Total	
	Male	Female	Total	Morph. Pos.	Vir.	Morph. Pos.	Vir.	Morph. Pos.	Vir.	Morph. Pos.	Vir.	Morph. Pos.	Vir.	Morph. Pos.	Vir.
5– 9	293	250	543	2	2	1	0	3	2	0.7	0.68	0.4	....	0.6	0.37
10–14	268	265	533	1	..	5	1	6	1	0.4	....	1.9	0.38	1.1	0.19
15 & over	3	3	6	0	0	0	0	0	0	...	....	...	....	...	....
Total	564	518	1,082	3	2	6	1	9	3	0.5	0.35	1.2	0.19	0.8	0.28

TABLE 8

Diphtheria Carrier Surveys

Place	Number of Persons Examined	C. diphtheriae Isolated: Number	C. diphtheriae Isolated: Per cent	Toxigenic C. diphtheriae Isolated: Number	Toxigenic C. diphtheriae Isolated: Per cent
Kingston, Jan.–May, 1938	1,481	15	1.0	1	0.07
Kingston, Nov.–Dec., 1938	1,742	26	1.5	0	....
Total Kingston, 1938	3,223	41	1.3	1	0.03
Ossining, Jan.–Feb., 1939	1,082	9	0.8	3	0.28

TABLE 9

Rapidity of Natural Immunization as Shown by Schick Test Survey of Children Giving No History of Artificial Immunization, Kingston, N. Y.—1922 and 1938

Age Group	1922 Survey			1938 Survey		
	Number Tested	Negative		Number Tested	Negative	
		Number	Per cent		Number	Per cent
0– 4 years	60	22	36.7	15	0	0
5– 9 "	254	78	30.7	198	35	17.7
10–14 "	165	56	33.9	266	118	44.4
15 years and over	22	10	45.5	109	58	53.2
Total	501	166	33.1	588	211	35.9

ment in the City of Kingston. Forty-nine per cent of the 78 individuals giving no history of previous immunization were found to be naturally Schick-negative.

A carrier survey was carried out in Ossining in January and February, 1939, and of 1,082 individuals cultured, 9 were found to be carriers of microorganisms morphologically and culturally characteristic of *Corynebacterium diphtheriae*. Three of these cultures were found to be virulent.

Summarizing the results of the carrier surveys in these two areas, as shown in Table 8, the percentage of persons cultured in the first Kingston study found to be carriers of morphologically positive *Corynebacterium diphtheriae* does not differ markedly from that found in the second Kingston survey, nor from the findings in Ossining. However, the proportion of virulent organisms isolated in Ossining is significantly higher than in either of the Kingston surveys.

The effect of the present low prevalence of carriers of virulent *Corynebacterium diphtheriae* upon natural immunization apparently is reflected in the rapidity of natural immunization, as shown in the Schick test surveys in Kingston in 1922 and in 1938. Table 9 shows natural immunization as measured by the Schick test at the end of the two surveys according to age groups. It may be noted that in the age group 0–4 years, 36 per cent were Schick-negative as a result of natural processes of immunization in 1922. The group tested in this age group in 1938 was too small to be of significance. However, in the age group 5–9 years, 17.7 per cent were found to be Schick-negative. Moreover, a tabulation by individual years of age within this age group shows that less than 5 per cent of those 6 years of age were Schick-negative in the group tested in 1938. If it may be assumed that this is a measure of cumulative natural immunization, a comparison may be made of the results of natural immunization for the two periods.

In the 1922 survey, it was shown that approximately 35 per cent of the population under 5 years of age were rendered Schick-negative by natural processes, whereas as nearly as can be determined from the 1938 survey, the cumulative effect of natural immunizing processes resulted in immunization of not more than 5 per cent. The total "immunes" in a given population is a summation of immune individuals resulting from natural and artificial processes and, based on the evidence of diminishing natural immunization in Kingston, the ultimate effect of the artificial immunization of any given proportion of the population would have differed considerably in the two periods

TABLE 10

Estimates of Natural and Artificial Immunization Against Diphtheria, 1922 and 1938, Based on Evidence of Natural Immunization as Shown by Schick Test Surveys in Kingston, N. Y.

Per cent Population Given Immunizing Treatment	1922 Natural Immunes	1922 Artificial Immunes	1922 Total Immunes	1922 Per cent of Population Immune	1938 Natural Immunes	1938 Artificial Immunes	1938 Total Immunes	1938 Per cent of Population Immune
30	350	166	516	51.6	50	256	306	30.6
35	350	193	543	54.3	50	299	349	34.9
40	350	221	571	57.1	50	342	392	39.2
45	350	249	599	59.9	50	385	435	43.5
50	...	...	...	....	50	428	478	47.8
55	...	...	...	....	50	470	520	52.0

under consideration. This effect might very possibly materially influence the administration of the control program. That is, artificial immunization of a given proportion of individuals in which there was considerable natural immunity would have quite a different ultimate result from the immunization of the same proportion of a group having no naturally acquired immunity.

Table 10 shows an estimate of natural and artificial immunization against diphtheria in 1922 and 1938, based on the evidence of natural immunization as shown by the Schick test survey in Kingston, N. Y. These estimates are based on the assumption that 85 per cent of children given immunizing treatment in 1922 were rendered immune with the immunizing agent in general use at that time, and that 90 per cent of the children given immunizing treatment with immunizing agents in use in 1938 were rendered immune. This assumption is in keeping with reported results of the use of the different agents.

It may be observed that, according to this estimation, if 30 per cent of the population under 5 years of age were given immunizing treatments in 1922, the summation of artificial and natural immunity would result in the immunity of approximately 52 per cent of that population, whereas at the rate of natural immunization in 1938 if 30 per cent of the group were given immunizing treatment, the summation of natural and artificial immunization would result in immunity of approximtaely 31 per cent of the population. It may also be observed that, based on these estimates, in 1938 the artificial immunization of 55 per cent of this age group would be required in order to accomplish the ultimate immunization of the same proportion of the population that was immunized by the treatment of 30 per cent of the population in 1932.

SUMMARY

Carrier surveys in two New York State cities have shown that the prevalence of carriers of virulent *Corynebacterium diphtheriae* is extremely low. Schick test surveys have shown that a high proportion of school children are immune, but that in the cities surveyed this is largely the result of artificial immunization. There is at least suggestive evidence that natural immunization is decreasing, if it can be assumed that the Schick test results in individuals giving no history of artificial immunization in 1922 and 1938 is a measure of the rapidity of natural immunization. It is suggested that the low prevalence of virulent diphtheria bacilli has resulted in decreased natural stimulation to immunity.

NOTE: The author is indebted to Dr. Edward S. Godfrey, Jr., for advice and suggestions in carrying out the study and in the interpretation of the results, and to Morton Robins for assistance in tabulation of the data.

Diphtheria Immunization with Fluid Toxoid and Alum Precipitated Toxoid*

Progress Report

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THESE studies were planned to investigate the height and duration of the antitoxic immunity following immunization with fluid and alum precipitated diphtheria toxoid. For methods and details of the study, the reader is referred to the previous communication.[1] In this progress note only the most important results of the study will be brought up to date. A complete report will be made at a future date.

Since the last report, 723 children have been added, bringing the total number of children under observation to 2,523. A condensed summary of the age distribution of these children is shown in Table 1.

TABLE 1

Age Distribution of Children in the Study

Age	*Number*	*Per cent*
8 months–5 years	479	18.9
6 years–10 years	1,665	66.0
11 years–17 years	379	15.0

The diphtheria carrier survey has been extended for the 4th consecutive year; and the children under observation continued to live in an environment with low incidence of carriers of virulent diphtheria organisms. In this connection it might be of interest to report the following record of diphtheria incidence:

1936	4 cases
1937	3 cases
1938	None
1939 up to Oct. 15, 1939............	None

Actually, of over 3,992 cultures taken in 1939, only one, or 0.03 per cent, contained virulent *Corynebacterium diphtheriae.* Since 1936, 12,667 children have been cultured and a total of 25,210 cultures taken. The total number of children with positive KL cultures was 95, or 0.75 per cent. The results of the carrier survey are summarized in Table 2.

A summary of the antitoxin response to the different immunizing procedures is given in Table 3. Complete and significant figures are available for 4 months and 12 months after injection for each of the 4 procedures under study. Some results are available for 24 months and 36 months after injection, and these data are included for completeness.

It can be seen from Table 3 that the relative positions of the four groups when placed in an ascending scale of

* These studies are being carried out under a grant from the American Public Health Association and the U. S. Public Health Service, in coöperation with the Saginaw County Health Department and the Michigan State Department of Health.

† With the technical assistance of Anita Leavitt, Ann Sonderman, and Louise Hagaman.

TABLE 2

Results of Carrier Survey

Time	Number of Children Cultured *	Number of Children with Positive KL Culture: Number	Per cent	Number of Children with Pathogenic KL Culture: Number	Per cent	Number of Children with Non-pathogenic KL Culture: Number	Per cent	Number of Children with Positive KL Culture (No virulence test made): Number	Per cent
Length of Study 1936–1939	12,667	95	0.75	34	0.27	47	0.37	14	0.11

* A total of 25,210 cultures have been taken and examined, or approximately two per child.

TABLE 3

Comparison of Antitoxin Response to Different Immunizing Procedures in Children Having Less Than 0.001 Unit of Antitoxin per cc. of Serum at the Time of the First Injection

	Interval Between First Injection and Antitoxin Titration											
	4 Months			*12 Months*			*24 Months*			*36 Months*		
Procedure	*No. of Cases*	*% .001 or More*	*% .01 or More*	*No. of Cases*	*% .001 or More*	*% .01 or More*	*No. of Cases*	*% .001 or More*	*% .01 or More*	*No. of Cases*	*% .001 or More*	*% .01 or More*
2 injections fluid toxoid 3 wk. interval	240	65.5	32.5	183	57.9	27.9	114	50.8	24.6	...	....	....
1 injection alum precipitated toxoid	413	92.0	58.1	379	88.1	49.0	361	79.8	36.6	120	70.0	23.3
3 injections fluid toxoid 3 wk. interval	393	96.2	71.2	203	94.2	64.5	51	92.2	68.6	...	....	....
2 injections alum precipitated toxoid 2 wk. interval	332	100.0	96.0	203	100.0	92.7	...	....	....	...	....	....

antitoxin response has so far not changed with time. It seems definite from the results in Table 3 that the use of 2 injections of fluid toxoid with a 3 week interval is definitely inferior to the other procedures tried as a means of stimulating antitoxin response in children. If the group of all children having 0.01 unit or more of antitoxin per cc. of serum is taken as the level of comparison, it can be seen that even after 12 months 1 injection of alum precipitated toxoid has stimulated more children (49.0 per cent) to this high level than 2 injections of fluid toxoid did at the peak titration 4 months after injection (32.5 per cent). The level of 0.01 unit of antitoxin per cc. of serum is considered by many to insure a Schick-negative reaction in the individual.

It would seem that the health officer would be justified in choosing one of the other three methods of immunization (3 injections of fluid, 1 injection of alum precipitated, or 2 injections of alum precipitated toxoid) in preference to 2 injections of fluid toxoid given with a 3 week interval.

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Diphtheria Studies, Toronto

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Diphtheria Carrier Surveys, Toronto

The results of diphtheria carrier surveys in Toronto are shown in Table 1. These surveys were carried out with the coöperation of Dr. Gordon Jackson, Medical Officer of Health, Dr. A. B. Moffat, Bacteriologist of the Department of Public Health, City of Toronto, and the School of Hygiene.

TABLE 1

Diphtheria Carrier Surveys in School Children
Toronto, 1934–1939

	Number Cultures Examined	*Number Positive*	
		Morphology	*Virulence*
1934—			
May–June	1,453	16	0
Nov.–Dec.	1,335		
1935—			
Jan.–June	1,821	12	0
1935–36—			
Nov.–April	1,862	6	1
*1936—			
Oct.–Dec.	1,145	24	2
*1937—			
Jan.–May	1,327	19	2
1938—			
Jan.–June	1,800	5	0
Oct.–Dec.	848	5	0
1939—			
May–June	969	1	0
Total	12,560	88 (0.7%)	5 (0.04%)

* All cultures plated on tellurite blood agar

In general, children presenting themselves for physical examination in the public schools had nose and throat swabs taken by the physician. Approximately 200 such cultures were obtained each week from children of schools scattered throughout the city. In this way the survey represents a cross-section of the school population during the time of the survey which was in this sense continuous. These swabs were rubbed upon one slope of Loeffler's medium, examined by a bacteriologist, and "positive" or "suspicious" cultures sent to the School of Hygiene where the cultures were plated upon tellurite blood agar for identification. The utilization of dextrose, saccharose, and starch was determined, and intradermal virulence tests on rabbits were carried out upon colony cultures when indicated on the basis of these tests—i.e., utilization of dextrose, non-utilization of saccharose. From October, 1936, to May, 1937, 2,472 cultures were plated on tellurite blood agar without an initial microscopic examination for the morphological appearance of the culture.

During the period of these carrier surveys the diphtheria case rate was low in Toronto. The following are the case rates per 100,000 population in the respective years 1934 to 1939: 3.5, 7.2, 7.0, 6.0, 4.0, 1.1 (Jan.–Sept.). There were no deaths in 1934 and in 1937. The population of Toronto is 648,300 (1937).

TABLE 2

Diphtheria Antitoxin in Sera of Children, by Age Groups and Locality

	Amos, Que.				Toronto, Ont.				Winnipeg, Man.			
	<1/500 Unit		>1/500 Unit		<1/500 Unit		>1/500 Unit		<1/500 Unit		>1/500 Unit	
Age Group	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
0– 4 years	76	95	4	5	13	87	2	13	..	..	..	..
5– 9 years	228	82	51	18	118	84	23	16	91	94	6	6
10–14 years	93	67	45	33	15	68	7	32	47	75	16	25

Diphtheria Antitoxin in the Sera of Uninoculated Children in Certain Localities in Canada

In Table 2 are shown the results of antitoxin titration of the sera of uninoculated children geographically widely separated in Canada. The sera from Quebec were collected in 1936 and in 1938 by Dr. Poliquin. The remaining sera were obtained in 1937, 1938, and 1939. Table 2 shows the per cent of sera from children of specified age groups falling into the two categories, those with more than 1/500 unit per cc. and those with less than 1/500 unit. If the Schick level is accepted as at or near 1/250 unit of antitoxin per cc. of serum, it is safe to assume that those children whose sera show less than 1/500 unit would be Schick positive and non-immune to diphtheria as judged by the generally accepted standards. One-third of the sera falling in the group of more than 1/500 unit were tested for 1/250 unit and all were found to contain more than 1/250 unit. Hence it is reasonable to infer that the vast majority of the children in the group of more than 1/500 unit would be Schick-negative. The localities are geographically widely separated. Amos is a newly settled mining center. The inhabitants have emigrated from many parts of the Province of Quebec. Winnipeg has a population of 223,103; Toronto, 648,300.

TABLE 3

Summary

Diphtheria Antitoxin in Sera of 835 Children—Amos, Toronto, Winnipeg

	<1/500 Unit		>1/500 Unit	
Age Group	No.	%	No.	%
0– 4 years	89	94	6	6
5– 9 years	437	85	80	15
10–14 years	155	70	68	30
Total	681	82	154	18

Table 3 is a recapitulation of Table 2, showing in summary the age groups from the three localities.

Table 4 shows the results reported by Dr. G. M. Little for children in the Red Deer Health District, Alberta. It is evident that a very high percentage of children, namely 96 per cent of the uninoculated control group, are Schick-positive. It is suggested that the problem of immunizing and keeping immune such a group living in a non-diphtheria environment is more acute than would be the case were they living in an environment where diphtheria is prevalent.

TABLE 4

Report of Schick Tests

Red Deer Full-time Health District

G. M. Little, M.D., D.P.H.

Toxoid Given 1933	No. Schick-Positive 1935	%	No. Schick-Negative 1935	%	Total Children
1 dose	21	85	4	15	25
2 doses	24	25	71	75	95
3 doses	17	1.5	1,114	98.5	1,131
		Control Group			
0 doses	902	96	38	4	940

Per cent Distribution of Diphtheria Antitoxin 5 Years after 3 Doses of Toxoid and Diphtheria Antitoxin Response to a Secondary Stimulus

In Table 5 is shown the per cent distribution of antitoxin in the children 5 years after 3 doses (0.5, 0.5, 1.0 cc.) of fluid toxoid, as compared with the

TABLE 5

Diphtheria Antitoxin in Children
3 Months and 5 Years after 3 Doses of Toxoid

Locality	Interval after Toxoid (0.5, 0.5, 1 cc.)	Number Tested	Per cent Distribution by Antitoxin Levels		
			1/500 and>	1/250 and>	1/50 and>
Toronto	3 Months	108	99	99	94
Whitby	3 Months	134	97	93	82
Toronto	5 Years	209	96	90	66
Hamilton	5 Years	187	98	93	78
St. Catharines	5 Years	156	97	94	70
Total	5 Years	552	97	92	71

distribution 3 months after 3 doses. The 108 children of the Toronto group were selected on the basis of Schick test only. It was unfortunately not possible to obtain blood samples in this group initially. The Whitby group was selected on the basis of serum titration. Only those showing <1/1,000 unit were given 3 doses of fluid toxoid. The remainder of the children shown in the table were unselected. That is to say, their immunity status was not initially assessed in any way. One may be tempted to assume, judging by the comparison with other data presented for groups in Canada, that not more than 15 per cent might have been Schick-negative initially. Indeed, because of the ages of the groups the percentage of non-immunes may be assumed to be much less.

In Toronto all children were 2 years of age or under when given toxoid. In St. Catharines and Hamilton 66 per cent were 6 years old or under. It is evident from these and other data that antitoxic immunity diminishes over a period of time. Reinforcement of antitoxic immunity is desirable in children given toxoid during preschool life by a secondary stimulus ("dose de rappel" of Ramon) given a year or two after the basic immunizing doses, or at least on entering school. It is, of course, well known that the antitoxin response to a secondary stimulus is rapid and attains a relatively high level. This is well illustrated in Table 6 which shows the

TABLE 6

Response to 0.1 cc. Toxoid in Persons Given 3 Doses of Toxoid 5 Years Previously

Number Tested	Titer before 0.1 cc. Toxoid	Response in 5 Weeks	
		>1/20 to ½ Unit	>½ Unit
8	<1/1,000	3	5
12	>1/1,000 to <1/250	2	10
30	>1/250 to <1/50	4	26

antitoxin response to 0.1 cc. of fluid toxoid given subcutaneously in a group of children who had 3 doses of fluid toxoid 5 years previously. In every instance the level of antitoxin rose to more than 1/20 unit. Of the 50 children, 20 might be considered as representing a Schick-positive group, 8 of whom had no detectable (<1/1,000 unit) antitoxin.

Recommended Diphtheria Immunization Procedures

RECOMMENDED procedures for obtaining community protection against diphtheria by artificial active immunization have been prepared by the Sub-Committee on Evaluation of Administrative Practices in response to a request of the Committee on Administrative Practice at its meeting on December 4, 1939.

The Sub-Committee on Diphtheria, which has undertaken comprehensive studies to determine the relative safety and value of various procedures and products employed in artificial active immunization, has preferred not to formulate recommendations until their studies have been completed.

There remain many controversial points and diversities of opinion with regard to recommendations for routine adoption by administrative officers of health.

The Sub-Committee on Diphtheria is not charged with making recommendations, but with scientific study of the facts upon which administrative practices may properly be based. The Evaluation Committee accepts responsibility for the following recommendations which they believe express the practices which, in the present state of our information and experience, should be followed by local and state health departments.

The Committee on Administrative Practice, on the recommendation of its Sub-Committee on Evaluation of Administrative Health Practices, offers the following advice to health officers on methods of artificial active immunization against diphtheria. It should be kept in mind, however, that while some of these recommendations are made on the basis of controlled observations and experiments, others are based upon results of uncontrolled and unverified experiences. These latter appear to be practicable but are undergoing further study at the present time.

It is recommended that:

1. The preferred practice should be for children under school age,[1] and preferably for those at the 9th month of life, (a) two doses of diphtheria toxoid, alum precipitated, with a 4 week or 1 month interval between the doses, or (b) three doses of diphtheria toxoid at 4 week or 1 month intervals.[2]

2. In communities where it is impracticable to give two doses of diphtheria toxoid, alum precipitated, or three doses of diphtheria toxoid, (1a or b), to all the children between 9 months and 10 years of age, it will probably be found that the giving of one dose of diphtheria toxoid, alum precipitated, to a large number of children of this age group is more effective in preventing diphtheria in the community than the use of the two or three doses (1a or b) for half as many children.

3. To those children receiving one injection of diphtheria toxoid, alum precipitated, a single reinforcing dose of not more than one-half the usual dose of an equivalent diphtheria toxoid, alum precipitated, preparation should be given to each child inoculated in infancy, just prior to the child's entering school at 5 or 6 years of age, or 3 to 5 years after the initial inoculation if

this has been carried out at some time later than the first year of life.[3]

4. As a routine procedure the performance of the Schick test 3 to 6 months after completion of the inoculations in infancy is not considered to be essential, although it may be desirable in private practice and whenever the personnel and condition of access to patients at public clinics makes this additional contact practicable.

5. (a) Children of 10 years of age or over who are known to be susceptible as the result of the Schick test should receive three doses of diphtheria toxoid at 4 week or 1 month intervals, or equivalent doses of toxin-antitoxin similarly spaced. (b) For susceptible adults who may be exposed by occupation to contact with the clinical or carrier stage of diphtheria, the use of diphtheria toxoid, alum precipitated, is not recommended. In the case of adults with occupational hazards (e.g., physicians, nurses, attendants in hospitals for communicable diseases) those reacting to a sensitivity test should not be inoculated[4]; others should receive three doses of diphtheria toxoid or toxin-antitoxin as advised for children over 10 years of age (5a). The routine period of Schick test should be 12 months after completion of inoculation, unless there is a special reason for giving the Schick test earlier. The immunity produced is probably at its highest 3 or 4 months after the completion of the inoculations.

6. The practice of administering diphtheria toxoid in two doses at 3 week intervals should be discontinued.

FOOTNOTES

1. If there has been failure to undertake active immunization of a child prior to school age, either of the initial immunizing procedures advised here for younger children can safely be employed for children up to the end of the 9th year of life.

2. The comparison of the response induced by two doses of diphtheria toxoid, alum precipitated, and three doses of diphtheria toxoid indicate a somewhat higher response produced by the use of the former, although the results in both have been extremely satisfactory. Only preparations of antigenic potency officially acceptable should be used.

3. Whatever the method of initial artificial active immunization used in infancy or early childhood, one reinforcing dose of half the size used in the initial dose, or series of doses, of an acceptable antigenic agent, whether diphtheria toxoid, or diphtheria toxoid, alum precipitated, should be given to the child at school age (5th to 6th year) or 3 to 5 years after the initial dose, if this was given later than the first year of life.

4. Some members of the Sub-Committee on Diphtheria have successfully protected adults reacting to the sensitivity test by using doses of toxoid or of toxin-antitoxin smaller than those used for non-reactors.

Committee on Evaluation of Administrative Practices
HAVEN EMERSON, M.D., *Chairman*
A. W. FREEMAN, M.D.
J. E. GORDON, M.D.
J. W. MOUNTIN, M.D.
J. L. RICE, M.D.
HENRY F. VAUGHAN, DR.P.H.
W. F. WALKER, DR.P.H.

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and THE NATION'S HEALTH

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CONTENTS

Continued on page vi

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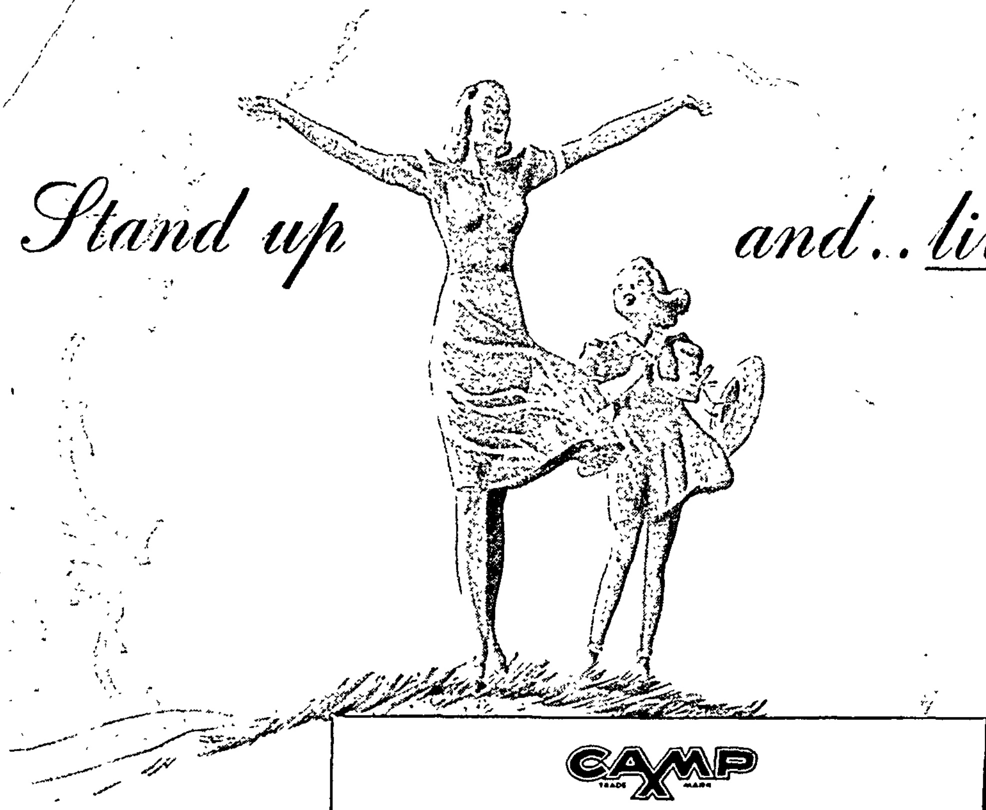

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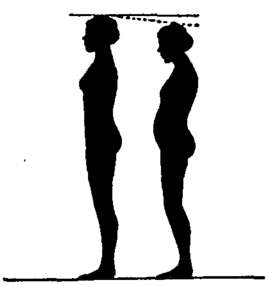

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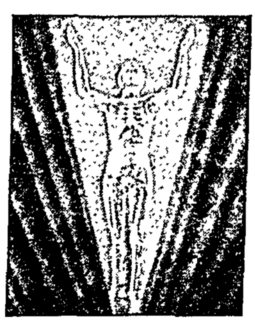

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Continued on page viii

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Contents—Continued

INDEX TO ADVERTISERS

American Journal of Public Health
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Volume 30 April, 1940 Number 4

A Half-Century of the Massachusetts Public Health Association*

C.-E. A. WINSLOW, Dr.P.H., F.A.P.H.A.

Professor of Public Health, Yale School of Medicine, New Haven, Conn.

WE are here tonight to commemorate a beginning, one of the most notable beginnings in the history of American public health, for the founding of the Massachusetts Association of Boards of Health was an event of importance far beyond the confines of its native Commonwealth.

In connection with any such occasion, I always think of a poem by Muriel Stuart called "The Seed Shop" which to me stands as an almost perfect symbol of the latent power of germinal things. She says:

Here in a quiet and dusty room they lie,
Faded as crumbled stone or shifting sand,
Forlorn as ashes, shrivelled, scentless, dry—
Meadows and gardens running through my hand.

. . . . . .

In this brown husk, a dale of hawthorn dreams;
A cedar in this narrow cell is thrust
That will drink deeply of a century's streams,
These lilies shall make summer on my dust.

Here in their safe and simple house of death,
Sealed in their shells, a million roses leap;
Here I can blow a garden with my breath,
And in my hand a forest lies asleep.

Such a seed-bed—full of rich promise of future blossoming—was the organization of the Massachusetts Association of Boards of Health, 50 years ago. To understand its full significance, we must consider the background of the times, and measure the progress made since 1890.

The Twenty-first Annual Report of the State Board of Health of Massachusetts for 1889 will give us such a reference point. The board, at that period had a budget of $44,000, of which $26,000 was spent for work on water supply and sewage disposal and $10,000 on control of food and drugs. The introductory report of the board itself devotes more than half its space to epidemiology and isolation of such diseases as smallpox, diphtheria, scarlet fever, and typhoid.

One may gain an even better picture of the theoretical knowledge of the period by turning to such a contemporary textbook as Coplin and Bevan's *Manual of Practical Hygiene,* published in 1893. Its first chapter on the Cause and Prevention of Disease and a final chapter on Technic give us a glimpse of the new world of Bacteriology which was opening to the vision of the early

* Presented at the Golden Anniversary Meeting of the Massachusetts Public Health Association in Boston, Mass., January 27, 1940.

90's. Here, the production of disease by germs is clearly recognized, and nearly 20 of the organisms now known to be associated with those diseases are briefly described. Quarantine, isolation, and disinfection are discussed and Pasteur's work on chicken cholera is cited as possibly opening the way to an artificial control of immunity. The final chapter on Technic describes the microscope and simple bacteriological procedures for staining and culturing and for the examination of sputum, blood, and feces. These two chapters include Coplin and Bevan's highly creditable outlook toward the future. The rest of the book is based on the past and deals almost exclusively with traditional teachings in regard to personal hygiene and environmental sanitation. The longest chapter in the volume is on Habitations and deals exhaustively with heating and ventilation, plumbing, building construction, and home planning. In spite of its emphasis on the carbon-dioxide standard for atmospheric impurity it is more practical and helpful than the treatment of housing in any 20th century textbook on hygiene with which I am familiar.

On the whole, however, it is clear that the basis of the health program of the 90's included three major elements: a body of vague and ill-substantiated empirical observations with regard to personal hygiene, much of it coming down from Galen but vitalized by the pioneer studies of Pettenkofer and his school at Munich; a clear and basically sound conception of the importance of environmental sanitation grounded in the experience of nearly 50 years of sanitary reform initiated by Chadwick in England; and a crude but valuable technic of isolation and disinfection gradually developed from the procedure of the books of Leviticus and Deuteronomy, through experience with leprosy, bubonic plague, and cholera, from the Middle Ages down. This basic empirical knowledge was just beginning to be touched—but was not yet transformed—by the germinating science of bacteriology. As Dr. F. P. Denny has said, in his excellent historical sketch of the Association:

> The activities of Boards of Health in 1890 were practically limited to the quarantining of cases of diphtheria, scarlet fever, and smallpox, and the abatement of nuisances. Tuberculosis was not reportable. There were no sputum examinations, and practically no hospital beds for cases of this disease. There were no state or municipal laboratories, no cultures for diagnosis of diphtheria. The carrier state was unknown. Typhoid cases were frequent, but an important step towards the elimination of that disease had just been taken in the establishment of the Lawrence Experiment Station. Supervision of municipal milk supplies was negligible . . . Public Health in 1890 was thus an almost virgin field.

It was in this primitive intellectual climate that Dr. J. C. Coffey, Health Officer of the City of Worcester, had the courage to visualize the organization whose first half century of service we are celebrating. On November 8, 1889, L. F. Woodward, Chairman of the Worcester Board of Health, sent out a letter suggesting the organization of an association " to discuss topics of sanitary interest, to aid legislation and secure enforcement of existing statutes, to compare rules and ordinances of local boards, to secure coöperation for suppression of disease." On January 11, 1890, the organization meeting was held with 35 persons present, and on March 19, at the first regular meeting of the Association, Dr. H. P. Walcott (Chairman of the State Board of Health from 1886 to 1914) was elected President, Dr. S. H. Durgin (Health Officer of Boston from 1873 to 1912) Vice-President, and Mr. Woodward, Secretary.

As Dr. Denny has said,

> The original membership of the Association was comprised largely of Chairmen, members,

and agents of Boards of Health. They had no training whatsoever, although many had considerable experience. None had any knowledge of the basic sciences, especially bacteriology, on which progress in public health was to depend so largely. Except for these meetings of the Association, and the *Journal,* there was no opportunity for those connected with Boards of Health to get information as to how their procedures might be improved.

Through the machinery of the Association, however, these earnest but untrained servants of the state were brought into contact with the brilliant minds directing the Massachusetts State Board of Health in its pioneer work on water and sewage, with Dr. Charles V. Chapin (Health Officer of Providence, R. I., from 1884 to 1931) and with Prof. W. T. Sedgwick (Professor of Biology at the Massachusetts Institute of Technology from 1883 to 1921) and his staff. It is difficult to exaggerate the supreme value of the cross-fertilization between theory and practice which ensues from such a meeting ground for practical field workers on the one hand and university investigators on the other.

My personal contact with the Association began in 1898 when I was a senior student at Technology under Sedgwick. Walcott and Durgin were still serving as President and Vice-President of the organization, posts which they continued to fill till 1913. I remember well the meetings held in the grill-room of the Hotel Brunswick in winter and down the harbor in summer. I have still on my shelves the early issues of the *Journal of the Massachusetts Association of Boards of Health* (first issued in 1901, changed to the *American Journal of Public Hygiene and Journal of the Massachusetts Association of Boards of Health* in 1904, to the *American Journal of Public Hygiene* in 1910, and turned over to the American Public Health Association to become our national public health organ in 1911). I came to know well most of the pioneer leaders of the Association.

Walcott remained an Olympian figure, stately and remote, only appearing on some special great occasion. Durgin, however, scarcely missed a meeting and was the usual presiding officer. He was small, prim and precise, with a curious trick of rocking up and down slightly on the balls of his feet. He was a trifle pompous, with a keen sense of the importance of his position in the community and, though known as "Sammy" in third-party conversation, no one took any liberties with Dr. Durgin to his face. I recall vividly one occasion at a State House hearing on an anti-vaccination bill, where a speaker tried to heckle him because a ship in the harbor with a smallpox case on board had been allowed to dock before the established quarantine period. "Gentlemen," he said, rising slightly on his toes, "I hold the public health of Boston in one hand and its commerce in the other." A good maxim for the health officer, if the scales be not allowed to dip too far; and Dr. Durgin held the balance true.

Of Sedgwick, it is more difficult to speak because my association with him for 15 formative years of my life was so close and intimate. To all who came under his influence even in slight degree he was the beloved teacher. He had at least three very great qualities. The first was a power of visualizing relationships, of seeing every phenomenon in relation to other phenomena, past, present, and to come. He took a fact or an idea and tossed it up in the air like a ball so that it could catch the reflection of light from every quarter. I recall vividly a session in Plant Physiology where nearly the whole hour was spent in discussing why Catholics have stained glass windows in their churches and certain Protestant

sects do not. The rôle of a flower in plant life was the key to an understanding of the part played by esthetics in human experience. Professor Sedgwick never liked me to tell that story; but to my mind it perfectly exemplified his gifts as a teacher.

In the second place, Sedgwick had a rare gift of rationality and of reasonableness, which has a slightly different connotation. He was completely ready to follow the truth wherever it might lead; but he had a wise and wholesome respect for authority and even for the empirical views of mankind in general, which he always pointed out were likely to contain fundamental elements of truth. Once in a class when I was contending a little brashly for some callow theory he tipped back in his chair, looked out of the window, and remarked, "It is possible that the scientific world is wrong and Mr. Winslow is right; but it is more probable that the scientific world is right and Mr. Winslow is wrong." I have never forgotten that lesson.

The third outstanding quality of Sedgwick was his sublimely complete and quite automatic sense of social responsibility. Once when I had a long talk with him about my career he said, "Well, Winslow, I think you can be a very useful man." Not a rich man, not a successful man, but a useful man. It never entered his head that anyone could have any other motive than to be useful. He assumed, without any question, a fundamental honesty and unselfishness in every human being. It was most amusing when he assumed public office as a trustee of the Pauper Institutions of the City to see the impact of this attitude on somewhat hardened politicians. They were at first surprised and somewhat uncomfortable; but they were ashamed not to live up to the astonishing standards set, and they did live up to those standards while they worked with him. In my years of observation of Sedgwick's contacts with his pupils, the number who disappointed his expectations was very small, for human nature is a complex thing and you can find in it good or evil, depending on the touchstone you apply.

Finally, a word must be said about Chapin, the third member of the triumvirate who guided the thinking of the Association in its early days. He is not merely a historic figure but a living and beloved friend; and I suggest that we send from this meeting a special greeting to Dr. and Mrs. Chapin on this occasion. In person, quiet and unassuming, gentle and gracious, warm-hearted and companionable, in the field of public health science, he has been one of the great creative figures to whom, more than to any other thinker, we owe the modern concepts of epidemiology and the present-day program of administrative procedure.

It was peculiarly fortunate that the health workers of Massachusetts could have the guidance of such men as Chapin and Durgin and Sedgwick in the last decade of the 19th and the first decade of the 20th century. Never before, nor since, has there been such a rapid unfolding of new knowledge which had to be interpreted and transmuted into administrative practice.

In 1890, the Lawrence Experiment Station published its first classic report on sewage treatment, and vonBehring first treated diphtheria with antitoxin.

In 1892, Smith and Kilbourne presented their brilliant report on Texas fever, Park in New York and Koch in Germany first demonstrated the importance of the carrier state, and Park first developed bacteriologic control of diphtheria on a practical administrative basis. Here in Massachusetts, Sedgwick, in the 1892 Massachusetts State Board of Health Report, made the first

great contribution of American epidemiology and before this Association presented a pioneer paper on the bacteriology of milk.

In 1893, the completion of the Lawrence filter initiated modern water purification in America. Biggs in New York established the first administrative program for the control of tuberculosis.

In 1894, Boston inaugurated the first system of medical school inspection in the United States, and Cameron described his septic tank.

In 1896, Wright, Pfeiffer, and Kolle began vaccinating against typhoid fever, and Widal introduced his blood test.

In 1897, Shiga discovered the dysentery bacillus, and Ehrlich developed his theory of immunity, while Ross made his basic researches on malaria.

In 1899 came the demonstration of the mode of transmission of yellow fever by Reed and three associates (Carroll, Lazear, Agramonte) at Havana and of typhus fever by Nicolle.

In 1901, Bordet and Gengou introduced the complement-fixation test.

In 1902, Chapin presented before this Association his first clear challenge of the traditional filth theory of disease, the initial step in his classic work on Sources and Modes of Infection, published in 1910. In the same year, Miss Wald initiated school nursing in New York City.

In 1903, tuberculosis nursing was initiated in Baltimore under the leadership of Osler.

In 1904, the National Tuberculosis Association was founded.

In 1905, the germs of syphilis and whooping cough were discovered.

In 1906, the Wassermann test was introduced, and Hopkins began his studies on accessory food factors.

In 1907 von Pirquet introduced the skin reaction in tuberculosis.

In 1908, chlorine was first used in the treatment of a municipal water supply at Jersey City, and the first Division of Child Hygiene was established by the New York City Health Department.

In 1909, the National Committee for Mental Hygiene was organized.

In 1910, Ehrlich discovered salvarsan.

Is it any wonder that, during these 20 years, progress in the new science and art of public health was rapid and spectacular? In the State of Massachusetts during the period of 21 years between 1889 and 1910, the diphtheria rate decreased by 80 per cent, the typhoid death rate by 70 per cent, the death rate from pulmonary tuberculosis by 48 per cent, the infant mortality rate by 17 per cent, and the death rate from all causes by 16 per cent.

The year 1910 may conveniently be taken as marking the limit between two major phases of emphasis in the public health campaign. Between 1890 and 1910, it may fairly be said that the health officer was preoccupied with two major objectives, the sanitation of the environment on the one hand, and isolation and artificial control of immunity on the other—both of these objectives relating to the defense of human beings against the germs of communicable disease. The traditional sanitation of the environment which had formed the basis of the sanitary awakening in the 19th century and the empirical quarantine procedures which had come down through the Middle Ages were revivified and made precise and effective by the new science of bacteriology. The sanitary engineer and the bacteriologist were then the chief protagonists of public health, the first eliminating typhoid by the purification of water supplies and the second robbing diphtheria of its terrors by the use of antitoxin.

A new emphasis, however, had al-

ready begun to manifest itself. The foundation of the National Tuberculosis Association in 1904, and of the Society for Sanitary and Moral Prophylaxis in 1905, of the Association for the Prevention of Infant Mortality and the National Committee for Mental Hygiene in 1909, opened a widely different vista. The founders of the tuberculosis movement and the infant welfare movement were interested, it is true, in disinfection of sputum and in the pasteurization of milk. They were also concerned, however, with the vital resistance of the individual. Emphasis shifted from inimical forces in the physical environment to resources of power in the physiological organism. Health became, for the first time since the days of Ancient Greece, a positive ideal; and this ideal could be realized only through focusing educational and reconstructive forces on the individual human being. Public health was no longer concerned only with the maintenance of a sanitary environment but with the strengthening of the individual for the war against disease.

With this change of emphasis, came a notable enlargement of public health personnel. The sanitary engineer and the inspector, the laboratory worker and the epidemiologist, were still of vital importance; but alongside them, new figures appeared. To develop habits of healthy living we needed machinery for personal education; and we turned to the visiting nurse and transformed her into the public health nurse. A few pioneers had seen this vision very early. Florence Nightingale conceived of the nurse as a "health missioner" and here in Boston you founded an organization with the illuminating title of Instructive District Nursing Association as far back as 1886—a historically glorious name, which has been regrettably abandoned. It was only after 1905, however, that rapid development of public health nursing took place. In 1902 there were only 136 such nurses in the United States, while in 1912 there were over 3,000. Today we wisely spend one-third of our total health budget on public health nursing.

It was this second major phase of the public health movement which first really brought the physician into the movement. In the early years of the century the health officer might or might not be a medical man but his major tasks were engineering and bacteriological. Today, the whole picture has changed. Prenatal clinics, infant welfare conferences, tuberculosis clinics, syphilis clinics, cancer clinics, heart clinics, mental hygiene clinics, are operated by the health department and by voluntary health agencies. Preventive medicine has become, not merely a phrase, but a reality. The physician rather than the engineer has become the central figure in the picture.

The results of the last three decades have been even more brilliant than those of the two which preceded them. Sanitation and bacteriology have continued to accumulate health dividends and educational nursing service and preventive medicine have added their quota to the profits. Here, in the State of Massachusetts, the 1937 mortality figures, as compared with those of 1910, show further reductions of 98 per cent in diphtheria, 97 per cent in typhoid fever, 92 per cent in measles, 88 per cent in scarlet fever, 70 per cent in pulmonary tuberculosis, 67 per cent in infant mortality, and 27 per cent in deaths from all causes.

The process of integrating medicine into the public health program and making it really effective as a preventive force is as yet by no means complete. It has made excellent progress in the fields of infant welfare and tuberculosis control and is beginning to be effective in the case of syphilis and—particularly in this state—in the control of cancer. The successes at-

tained have, however, only emphasized the need for more effective means of putting medical science to work so as to attain its maximum effectiveness. There is no longer any sharp line between prevention and cure. Almost every medical treatment—if successful—cures, so far as possible, disease processes already initiated and, at the same time, prevents those processes from going further. If the public health program is to attain its ultimate goal, the entire medical resources of the nation must be utilized to their full capacity.

That they are not now so utilized, has been made abundantly clear in many recent studies. In spite of our high proportion of physicians, our luxurious hospitals, our magnificent institutions for teaching and research, the economically less fortunate moiety of our population receives less than half of the physician's care, only three-quarters of the hospital care, only one-fifth of the dental care, and only one-tenth of the special nursing care utilized, and wisely utilized, on a higher economic level.

The problem here is basically an economic one. These people do not go without medical care because they do not want it, or because they do not need it. On the contrary, as we go down the economic scale and find less and less medical care, we also find more and more sickness. The lack of care is due to a lack of financial resources to pay for such care. Hence, the current discussion of the possibilities of health insurance.

In this discussion we must be on our guard against over-simplification of the issues. Not all of the American people need health insurance. As I pointed out in a discussion before the Town Hall Forum in New York some ten days ago, there is a small section at the upper economic level of our population which does not need any change in the present situation. They can now obtain the best medical care available and they can pay for it by the use of profits and reserves. They are self-insured.

There are much larger groups of people in the United States, however, who do urgently need health insurance. Sickness is not an average problem but an emergency. In general, at any income level, it appears that in a particular year one family out of each hundred has medical bills amounting to between one-fourth and one-half of its total annual income, while other families in that year have no medical costs at all.

The answer to such an unequal distribution of costs is of course very obvious. We deal with the other emergencies of life: fire, theft, death, by insurance—that is, by the pooling of the financial resources of a group of people over a period of time. It is obvious that the only way in which a family on the middle economic level can pay its medical bills is by the application of the same principle.

Below the small group of the wealthy is a second group which needs some form of insurance against the emergency costs of medical care but is sufficiently well off to purchase such service on a voluntary insurance basis. This is the group which can readily pay the average cost of medical care but which cannot budget for the unpredictable emergencies of sickness. It needs health insurance, but not necessarily compulsory health insurance.

More than three million of our population now purchase voluntary insurance to cover the costs of hospital care, and, through the development of such organizations as those represented in the Group Health Federation of New York, we have even more significant results in regard to voluntary insurance covering physicians' care as well. Voluntary insurance of this sort has developed new technics of distributing

medical care which offer real hope of achieving in practice the unrealized potentialities of modern scientific medicine; and it is contributing materially to the knowledge of administrative procedure and of the cost of adequate medical care essential to future organization in this field.

There is a third group in our population for whom no system of voluntary insurance can suffice. The families in this considerable group cannot pay even the average cost of medical care with sufficient ease to make them potential members of voluntary groups, and many of them can only pay a part of this average sum. Compulsory health insurance is the means by which health service can be extended to those who can pay only a part of the full average cost of medical care, through contributions to the fund by the employer and by the government—a provision included in all insurance acts. Thus, there is a considerable section of the population of the United States, primarily in its industrial areas, which needs and urgently needs compulsory health insurance, and within the general framework of our existing social order cannot obtain adequate medical care in any other way.

Finally, for the indigent in the cities and for the general population in many rural areas (where the social and economic conditions necessary as a background for insurance are lacking), an organized system of medical care supported from the tax levy is the only solution.

There is no simple answer to the question, nor any single panacea for the solution of the problem of medical care. For various sections of the population we need the traditional system of individualistic medical care, we need voluntary insurance, we need compulsory insurance, and we need an expansion and a far better organization of tax-supported medical care for the indigent in our cities and for the population of our rural areas. We need, in other words, a broad national health program employing various procedures, in the sense in which it was formulated by the conference held in Washington during the summer of 1938. Progress must be gradual and evolutionary; but if any progress at all is to be made it is essential that federal grants should be available to stimulate experimentation by the various states. We stand still and quarrel about details and about hypothetical damage to our vested interests, while men and women and children suffer and die for the lack of the resources of modern medical science. Let us forget slogans and avoid vague terminologies which arouse the secretion of the endocrine glands instead of stimulating the higher nerve centers. Let us recognize that the situation is serious and calls for action. Let us remember that there is no single easy solution of the problem, but that what we need is a national health program so constructed as to enable the people of these United States to obtain and to pay for the medical care that they need, whether they pay for it as individuals, as groups, or as taxpayers.

So much for the past, and for the most pressing problem of the present—the development of an orderly and effective program of medical care for the American people. What can we today surmise as to the problems which the Massachusetts Public Health Association will be called to meet in the future?

It is always dangerous to prophesy, but it seems to me clear that the major results to be expected in the reduction of mortality rates have nearly been reached. In the past half century, the death rate per 1,000 has, as we have seen, fallen from over 19 to less than 12. If the rate of 12 per 1,000 can be further reduced to 8, we shall be reaching a figure as low as can be reasonably

expected. After all, the human machine is only set to run for a certain period of years. The cycle from birth to death is a fundamental property of organic life. What the public health program has sought to do is to eliminate premature death, to attain the end so charmingly described by Oliver Wendell Holmes in the One-Horse Shay. That end should be accomplished in the half-century to come.

It would be a mistake, however, to assume that the Massachusetts Public Health Association can retire on its laurels when a maximum reduction of the death rate has been attained. With the disappearance of the plagues and pestilences of olden days, with the progressive conquest of more widespread or more chronic maladies such as tuberculosis and syphilis and pneumonia, fresh vistas open up and the very word "Health" takes on a new meaning. Preventive Medicine was a great advance over Alleviative Medicine; but Constructive Medicine—if I may coin a new term for a new ideal—will be better still. Health does not mean merely staying alive. It means, or should mean, something much more positive and dynamic. It should mean vigor and efficiency and joy in living. From this standpoint, the task of the public health worker has only just begun.

Take, for example, the problems of mental hygiene. We know that the number of beds, in any state, in institutions for the care of mental disease and defect is nearly equal to those occupied by patients suffering from all other maladies and defects taken together; and the same ratio holds for the conditions not so serious as to require institutional care. In the average family, the burden of mental and emotional maladjustment is certanly as serious as that produced by the whole gamut of so-called "physical" disorders. Mental hygiene is not a small sector of the public health program but a good half of it. Yet it is an area which today has been scarcely touched.

As soon as we accept this view of the public health objective as Constructive Medicine—the production of a nation of men and women and children possessed of vitality and effectiveness and happiness—the vision of our task correspondingly broadens. We realize, for instance, the importance of nutrition as a central public health problem of the future. Scarcely a month goes by without illuminating discoveries from the laboratory or the clinic which reveal new and unsuspectedly subtle influences of very slight deprivation of essential food elements. A group of workers in a factory who have shown an incapacity to perform their task of matching colors accurately are found to be suffering from a deficiency of vitamin A, although they are perfectly healthy from any ordinary clinical standard. The soundness of the teeth, it is reported, depends on a delicate balance of fluorine in the diet, enough to prevent dental caries and not so much as to cause mottled enamel. Our established standards of vitamin needs, based on the test of mere survival and reasonably normal growth, are almost certainly too low for the optimum promotion of longevity and resistance to disease, of efficiency and full vitality. Indeed, recent experiments have shown that minor deficiency may be even more serious than a gross shortage. The latter causes severe symptoms which attract notice and can be cured; while the former may lead to irremediable organic lesions over a period of months during which no warning symptoms appear.

A second major public health problem of the future is housing. Here, again, it is impossible to prove the health values involved by mere appeal to vital statistics. We find our highest death rates in the slums, it is true;

but no one can say how far these high death rates are the result of the bad housing, *per se*, of the poverty factors which cause people to live in bad houses, and of the physical and mental and moral handicaps which tend to make people poor. Yet if we approach the subject from another angle, it is easy to demonstrate that many aspects of bad housing are definitely inimical to physical and mental and social health. The Committee on the Hygiene of Housing of the American Public Health Association has listed thirty principles of healthful housing which exhibit a demonstrable relation of this sort. Some of them relate to fundamental physiological needs for heat and light and air; some to fundamental psychological needs for privacy, on the one hand, and for normal family life and normal community life, on the other, and for efficiency in the performance of the 60 hours a week of household tasks which the average household demands; some to protection against infection, by adequate and safe water supply, sewerage, and waste disposal and the exclusion of vermin; some to protection against home accidents which cause 30,000 deaths a year in the United States, more even than the death toll exacted by the automobile.

The health officer of the future will have more and more closely interlocking relations with local housing authorities in the choice of sites for new housing projects, in the selection of the tenants for such projects and in the compensatory demolition or rehabilitation of slum dwellings in other areas. Furthermore, if he is alert to the new conception of public health, he will take an active interest in the sound evolution of the housing program as a whole, a program whose very continuance at the moment hangs in the balance of Congressional action.

Similarly, the whole field of recreation presents what is essentially a public health problem, if constructive mental and social health can be visualized as clearly as merely preventive medicine has been in the past Finally, Social Security, in its broadest terms, offers fundamental contributions to the health of the citizen, since economic vicissitudes not only deprive their victims of food and medical care but create those national emotional morasses in which such monsters as a Hitler or a Stalin breed.

All of this, as it seems to me, suggests that public health is today passing through a sea change even more significant than that which occurred 30 years ago. Before 1910, we were concerned almost wholly with the physical environment, with polluted water and milk supplies, with dump heaps, and with the hostile germs of communicable disease. From 1910 to the present time, we have been preoccupied chiefly with the body of man, with the study and correction of its defects and the treatment of its disorders. Today we turn our eyes outward again to the environment, but to a different and more complex environment, to the social environment which man has created for himself and in which he lives and moves and has his being as truly as in the atmospheric ocean whose miasmas challenged the imagination of our predecessors of 1890. Then public health was an engineering science; today it is a medical science; may it not tomorrow be a social science?

If I am correct in this prognosis, there will be here a tremendous challenge to the vision and the courage of our public health profession. The tasks of the future will be more difficult and more complex than those of the past. The diphtheria germ had no friends; the insanitary but profitable tenement has powerful allies. Progress in nutrition, in housing, in social security, is being fought and will con-

tinue to be opposed by powerful vested interests.

Can we meet this challenge? I do not know. But the history of the Massachusetts Association of Boards of Health gives us the ground for a reasonable hope. If you had been present at the first meeting of this Association, could you have imagined that little band of untrained health officers and health inspectors passing from drains and quarantine placards to activated sludge and residual chlorine, to Kahn tests and sera for Type VIII pneumococci, riboflavin and cancer clinics? Perhaps the transition from our present-day administrative health program to a constructive remoulding of the social environment in which we live may be equally possible.

Civilization and democracy are today on trial. Civilization, as I see it, means richness and fulness and beauty of individual living; and democracy, the attainment of that ideal for all the people, and by all the people through their free and voluntary action. If progress is too long delayed, the temptation to seek the short cut of dictatorship may prove irresistible; but by such a short cut both democracy and civilization are destroyed together. I have no doubt of the ultimate outcome. No one trained by Sedgwick to see the pageant of life from the amoeba in the rock pool up to modern society can be a hopeless pessimist. But the process of evolution has its tragic periods of delay and reaction. Europe passed through 8 centuries of intellectual darkness between the years 200 and 1000. If England and France are not successful in their gallant struggle, Europe may face more centuries of the same kind.

As the most fortunate of all the peoples of the earth, we have a peculiar challenge to meet and our success or failure may well be a determining factor upon other continents than ours. Can we remain undeceived by ideological slogans and penetrate the deceit of those who use the term of "liberty" to cloak the fact of "privilege"? Can we keep our tempers and follow the path of reason and experimentation? Have we really the desire to build a society of opportunity for all, such as that of which our fathers dreamed? and have we the patriotism or the Christianity or the sense of justice to realize the desire at some cost to ourselves?

If the answer to these questions is in the affirmative, we can build a new world in the next half century; and, in that building, the science and art of public health must play a leading part.

Approaching the Health Problems of Adult Life Through Industry*

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THE health problems of adult life in industry are the occupational diseases and the ordinary diseases found in any adult group, regardless of employment. Both groups of diseases are being approached with good effect—the occupational diseases through industrial hygiene methods and the ordinary diseases through preventive medicine and public health.

However, owing to extensions in the scope of compensation, employers occasionally find themselves responsible for certain of the ordinary diseases. Therefore, industrial doctors are broadening their occupational disease control programs to include measures for the prevention of disabilities from ordinary sickness. These measures can be discussed under the following headings:

1. Special Disease Control Programs
2. Early Diagnosis Campaigns
3. Routine Case Finding Procedures, commonly called physical examinations but preferably known as health examinations

1. *The Special Disease Control Programs* apply to those diseases that are of industrial or quasi-industrial importance from a compensation standpoint. They are:

a. The occupational diseases
b. Tuberculosis
c. Syphilis
d. Diabetes

2. *The Early Diagnosis Campaigns* apply to those diseases that are of no industrial importance, except as causes of disablement. However, their early diagnosis is distinctly beneficial to the employees affected and, therefore, beneficial to industry. These are:

a. Appendicitis
b. Cancer
c. Pneumonia
d. Anemia
e. Pregnancy
f. The communicable diseases

3. *The Routine Case Finding Procedures* apply to a miscellany of diseases or conditions that appear as physical handicaps when workmen reach middle age. They are of growing importance to industry because, despite general opinion, all of industry does not discard employees simply for age.

Incidentally, the average age of workers in certain trades is rising. In General Motors Corporation for 1938, it was slightly less than 40, and 38.9 per cent of the entire employee group were over 40 years old. This means that practically two-fifths of all of the corporation's employees come within this class. Their special health problems, mostly of a chronic nature, are:

a. Diseases of the heart, vascular and renal systems
b. Diseases of the alimentary tract
c. Diseases of the nervous system
d. Genitourinary conditions
e. Goiters
f. Arthritis (rheumatism)

* Read at a Joint Session of the Health Officers and Industrial Hygiene Sections of the American Public Health Association, at the Sixty-eighth Annual Meeting in Pittsburgh, Pa., October 20, 1939.

g. Hernia
h. Focal infections

There are unquestionably many other diseases occurring in the industrial age group, but the above are selected because of their approachability through industry, and collectively their prevention or control offers a task of sufficient magnitude for the present.

A few out of each class will now be considered as examples to illustrate the opportunities of industry for coöperation with the health authorities and practising physicians and vice versa.

1. a. *The Special Occupational Disease Control Program*—This consists of the following:

(1) Knowledge of harmful materials, operations, processes, and working environments, known as "exposures."

(2) Control of exposures by industrial hygiene methods.

(3) Physical supervision of exposed workers. This entails proper or safe placement of workers and suitable examinations often enough for protection against the exposures.

(4) Treatment of diseases, usually by plant doctors, but occasionally by family doctors or specialists.

(5) Reporting of diseases. All diseases, whether disabling or not, should be reported to the health department.

Back of this program, and contributing greatly to it, is an immense amount of research developed largely by the U. S. Public Health Service, a few of the older and well established state bureaus of industrial hygiene, certain institutions of learning, some industrial toxicologic laboratories, and a scattering of physicians. Without such a background, industrial medicine would be greatly handicapped in its efforts to prevent occupational diseases. With it, considerable progress is being made, despite the fact that relatively few manufacturing establishments have the benefit of expert guidance.

On the contrary, a large proportion of the workers are employed in plants which are served in this respect by general practitioners who have little knowledge of occupational disease exposures and are not interested in them, but prefer only to treat injuries as they happen. This is said with no intent to criticise the general profession, because industrial medicine as now practised is somewhat new, but to suggest that if the profession wishes to take advantage of the opportunity, which it more or less insists upon it, it should prepare itself adequately for the service.

In the meantime, the engineering profession, to a considerable degree, has moved over into the field of industrial hygiene and is doing an excellent job in large industries particularly, and state departments of health have created bureaus of industrial hygiene which give promise of doing equally well in the small industries. The medical service of large plants also is becoming quite skillful in applying industrial hygiene methods. The weak spot is in the large sector of the profession that cares for the workers of small plants. This calls for instruction from those who are informed, and while departments of health are not especially prepared for educational activities, the health officers can accomplish a great deal by way of instruction through the industrial hygiene bureaus. Therefore, the occupational disease control program is left with this thought, that the official health agencies prepare themselves for leadership in the field of industrial hygiene—for its promotion, rather than its accomplishment. The latter should, in my opinion, be left with the industrial hygienists, the doctors, and the employers.

Note: To a considerable degree, the occupational disease control program is the basis of all disease prevention measures, in that it tends to give the workers healthy working conditions and through physical supervision, offers them an instrument for case finding.

1. b. *The Tuberculosis Control Program* consists of the following:

(1) Tuberculin tests supplemented by x-rays of chest in positive cases, or x-rays of all. These should accompany the routine health examinations, but there is no great objection to a quick survey of the plant population.

(2) Safe placement of inactive cases, with suitable physical supervision during employment.

(3) Conference with family physicians regarding active cases as soon as they are discovered. This usually terminates the responsibility of the plant physician until workers return for employment when item No. 2 again becomes effective.

(4) All cases are reported to the health department, preferably by the family doctor, or by the plant doctor, according to the wishes of the former.

With the effectuation of the above program, the responsibility of industry stops. It is, therefore, necessary that the community be organized to supplement the case-finding function of the plant physician by conventional investigation of contacts, treatment and rehabilitation of all cases discovered by him. As a matter of fact, this is being very generally done, except that possibly the full importance of industry as a case finding agency is not generally appreciated. It is, therefore, suggested that in setting up their tuberculosis control programs, health officers do not overlook the industrial resources for coöperation.

1. c. *The Syphilis Control Program* does not differ in its essential elements from the tuberculosis program. Of course, the communications are always private and there is no need to deprive a syphilitic of employment unless he is in a communicable stage of the disease.

As in tuberculosis, industry cannot be expected to go farther than case finding. Treatment is a responsibility of the general profession, and its extent and duration must rest in the judgment of the attending physicians. Leadership in developing the program is no doubt a function of the official health agencies.

1. d. *The Diabetes Control Program* also does not differ essentially from the tuberculosis program, except that the administration of insulin in some form is a life-time necessity and the real problem is to see that the patient continues his treatments. Coöperation between the plant physician and the family doctor is very necessary.

Under the heading, *Early Diagnosis Campaigns*, are listed those diseases, or conditions, which can be treated most advantageously if discovered early.

2. a. *Appendicitis* is a good example. This is the procedure:

(1) Employees are instructed to report to the plant doctor when suffering with pain in the abdomen, especially if the pain comes on suddenly while at work.

(2) Foremen are requested to coöperate in sending such employees to the medical department.

(3) The doctor checks the workman's medical record for history of previous attacks, examines the workman, and makes blood counts.

(4) If he finds evidence of an acute appendix, he informs the workman and in his presence telephones the family doctor, explains the condition he finds, and disposes of the patient according to instructions of the family doctor. Usually the patient is sent directly to a hospital where he is met by his own doctor.

The result of this procedure is usually early operation and early return to work.

All of the other conditions listed under early diagnosis campaigns are handled in much the same fashion, with slight variations according to circumstances. The essential feature in all of them is that the patient is put into contact with his regular doctor as soon as diagnosis is made, and that doctor is expected to carry on from that point.

With respect to *pregnancy* (2. e.) the advantages of early contact with the physician are obvious, and from the public health standpoint, it can be readily seen that here are additional opportunities for prenatal nursing supervision.

The advantages of early recognition of the communicable diseases are so evident from the public health standpoint as to require no discussion.

3. *The Routine Case Finding Procedures* are, in reality, periodic health examinations of all workers. Their primary object is the continued safe employment of the workers, but in its accomplishment, a great variety of physical defects and chronic diseases are found. As the examinations are made with a considerable degree of regularity, these conditions are usually found in fairly early stages of their development.

Employees who require treatment are promptly encouraged to consult their own physicians, and if their capacity for work is partially impaired, or if the effect of employment is possibly harmful to them, they are suitably employed under special medical supervision.

The benefits of the above in relation to their possible effects upon the public health are readily apparent, and the procedure seems to be a function that should be encouraged by the official health agencies. As a matter of fact, the modern type of industrial physician regards himself as the health officer of the group he serves. His approaches, his thinking, and his results are more or less in line with public health, yet it is only recently that he has awakened to that fact, and frankly, I do not believe that the official health group, generally speaking, is yet aware of it.

PUBLIC HEALTH AND INDUSTRY

Public health has an ally in industrial medicine. The question is how best to utilize it? The answer is through industrial hygiene bureaus or units which can render valuable services to industry. The services such a bureau can furnish are excellently outlined by H. G. Dyktor, Chief Industrial Hygiene Engineer of the Michigan Health Department, in a personal communication, as follows:

1. Make special tests, examinations, and studies which the plant medical department is not equipped or qualified to perform.
2. Provide detailed and specific information on toxic substances and harmful conditions.
3. Provide comparable statistics on other plants in the same industry or with similar problems.
4. Furnish industrial health statistics duly interpreted.
5. Correlate work of industrial hygiene in many plants to obtain uniformity.
6. Work with and through the plant medical department to obtain specific improvements, better housekeeping, and sanitation, etc.
7. Stimulate the plant medical department to concentrate on preventive measures.
8. Stimulate the plant medical department to interest itself in the worker's life beyond the confines of the plant.

In return for the foregoing, Mr. Dyktor says the following may be expected from the plant medical department:

1. The sincere desire to improve the health of the workers—altruistic but indispensable.
2. Support the industrial hygiene unit in its educational campaign to make both employers and employees as health-conscious as they are accident-conscious.
3. Supply the industrial hygiene unit with records of absenteeism, due to both sickness and accidents, for analytical examination.
4. Advise the industrial hygiene unit of its own experiences in preventive and control measures so that they may be useful to other plants.
5. Support the industrial hygiene unit in obtaining recommended improvements once they have been decided upon.
6. Coöperate with the industrial hygiene unit on the greater concept of industrial hygiene, *i.e.*, non-occupational diseases, housing, etc.

In closing, I wish again to quote from Mr. Dyktor, who says, ". . . through the industrial hygiene unit the entire force of the local health agency can be placed at the disposal of the plant medical department and thereby make a full health program possible."

I would add this corollary—that through the industrial hygiene unit, the

vast resources of industrial medicine can be made available to public health and the medical profession by the promotion and development of disease control programs in industry, early diagnosis campaigns, and periodic health examinations.

Thus, in short, the industrial physicians can be made, in reality, to be deputy health officers on the one hand and case finding agencies for the medical profession on the other, the objective being the maintenance of the health of the workers.

Health Council Functions

"The purposes of the (local) Health Council are primarily to promote the coördination of public and private health work and to aid in securing continuity of program; to serve as a forum for discussion of health and sickness problems, policies, and plans; to develop new standards of service and to improve present standards through joint study of special problems; to secure improvement in existing health facilities and services and the establishment of new or additional health facilities or services where needed; to prevent duplication of effort; and to give moral support to the existing department of health, in coöperation with the medical and dental societies. A health council functions by developing better understanding among the official and private health agencies of a city."—Professor Ira V. Hiscock, "Some Opportunities and Progress for the National Health Council."

Alkyl-Dimethyl-Benzyl-Ammonium-Chloride for Sanitization of Eating and Drinking Utensils*

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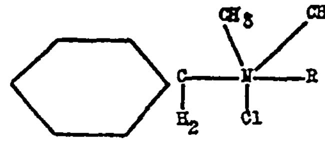
PUBLIC health authorities are more concerned than ever before regarding the spread of infection by direct contact, particularly as related to eating and drinking utensils in public places. That such utensils improperly washed and sanitized are carriers of bacteria and may be directly responsible for the transmission of disease is established.

Cumming and Lynch [1] in 1919, and Cumming later with other associates [2] demonstrated that influenza and saliva-borne disease may be transmitted by indirect contact through the medium of eating utensils. Mallmann [3] studied various types of detergents and disinfectants and concluded that chemical disinfection should be avoided where hot water is available. This conclusion was based upon the fact that chlorine compounds commonly used, may be bypassed by restaurant attendants to avoid odor on the glasses. Cumming and Yongue [4] in 1936, suggested further investigation into the application of chlorine to dish and utensil washing, stating that lack of extended tests left much to be proved regarding the practicability of this chemical.

Krog and Dougherty [5] drew attention to the high bacterial count of tumblers and wash and rinse waters in public places. They concluded that conventional washing methods act only as detergents and do not have appreciable bactericidal value. Public health measures are now more widely enforced, making compulsory some form of sanitization which has effected cleaner and less contaminated utensils. All of the methods advocated, from steam sterilization to chemical disinfection, however, have innumerable drawbacks, making present procedures far from ideal.

* Alkyl-dimethyl-benzyl-ammonium-chloride supplied by Alba Pharmaceutical Company under the trade name of "Zephiran Industrial," brand of benzyl-trialkonium-chloride.

. . . This organic compound, a metal-free solid of amber color and of soap-like consistency, is readily soluble in water. It has the following formula in which *R* represents a mixture of alkyl radicals (between C_8H_{17} and $C_{18}H_{37}$) derived from the fatty acids of coconut oil:



Antiseptic and Germicidal Properties of a Mixture of High Molecular Alkyl-dimethyl-benzyl-ammonium Chlorides, by Cecil G. Dunn, *Am. J. Hyg.*, July, 1937, p. 46.

The physical characteristics of a new chemical consisting of a series of alkyl-dimethyl - benzyl - ammonium-chlorides for disinfection and detergent purposes as reported by Domagk,[6] Dunn,[7] Heineman,[8] Walter,[9] and others, prompted us to investigate its use for sanitizing eating and drinking utensils in public establishments.

The writers have endeavored to determine the bactericidal efficiency and the practical utility, under various conditions, found in commercial application of alkyl - dimethyl - benzyl-ammonium-chloride.

EXPERIMENTAL

Laboratory investigations of alkyl-dimethyl - benzyl - ammonium - chloride were carried out as follows:

Glass tumblers, which on the basis of cleanliness and bacterial counts are generally accepted indices of dishwashing efficiency, were artificially contaminated with various suspensions in lactose broth of bacteria obtained from human feces and used as factors for observing bactericidal values. Heavy bacterial suspensions in sour cream were also used in order to determine whether or not fats were inhibitive to the bactericidal action of the sanitizing solution.

A cotton swab was used to smear the contaminant over the inner and outer areas of the tumbler that normally come in contact with the users' lips. The tumblers were allowed to dry for 5 minutes at room temperature, then immersed in alkyl-dimethyl-benzyl-ammonium-chloride solutions of various concentrations for different time and temperature intervals. At the end of each exposure, the tumblers were removed with sterile forceps to prevent accidental contamination, and swabbed after the technic described by Krog and Dougherty. The swabs were then placed in sterile test tubes containing 10 cc. 1/N saline solution, vigorously shaken in a Kahn machine for 3 minutes, and plated in the usual manner.

Immediately after being used for treating each series of tumblers, portions of the sanitizing solution, undi-

TABLE 1

Laboratory Tests

The Bactericidal Action of Alkyl-dimethyl-benzyl-ammonium-chloride at Indicated Concentrations and Time Intervals Using Nutrient Agar Lactose Broth Inoculated with Feces as the Contaminant

(a) Chemical Concen.	Exposure Time	Temp.	Av. Bac. Count	Control	(b) Sanitizing Sol'n.	Temp.	Av. Bac. Count	Control	(b) Sanitizing Sol'n.	Temp.	Av. Bac. Count	Control	(b) Sanitizing Sol'n.
1– 2,500	1 min.	54° F.	10	172,000	0	86° F.	0	230,400	0	116° F.	185	115,000	0
	2 "	"	10	234,000	0	"	25	"	0	"	5	"	0
	3 "	"	20	"	0	"	25	"	0	"	0	"	0
1– 5,000	1 "	"	230	144,000	0	"	25	"	0	"	0	110,000	0
	2 "	"	25	115,000	0	"	25	"	0	"	0	111,000	0
	3 "	"	70	"	0	"	40	"	0	"	0	110,000	0
1– 7,500	1 "	"	200	"	0	"	75	"	0	"	0	115,000	0
	2 "	"	140	"	0		(c)			"	10	110,000	0
	3 "		(c)			"	45	"	0	"	10	"	0
1–10,000	1 "	"	950	99,000	0	"	75	"	0	"	20	25,800	0
	2 "		(c)				40	"	0	"	5	"	0
	3 "	"	475	111,000	0	"	15	"	0	"	20	"	0
1–12,500	1 "	"	300	80,000	0	"	195	"	0	"	75	"	0
	2 "	"	275	84,000	0	"	20	"	0	"	25	"	0
	3 "	"	275	80,000	0	"	95	"	0	"	15	"	0
1–15,000	1 "	106° F.	100	46,080	0								
	2 "	"	40	"	0								
	3 "	"	65	"	0								

(a) Alkyl-dimethyl-benzyl-ammonium-chloride
(b) Alkyl-dimethyl-benzyl-ammonium-chloride solution
(c) Accidentally contaminated

TABLE 2

Laboratory Tests

The Bactericidal Action of Alkyl-dimethyl-benzyl-ammonium-chloride at Various Concentrations in the Presence of Several Detergents Commonly Found in Dish Washing Procedures, Using Lactose Broth Inoculated with Feces as the Contaminant

(a) Chemical Concen.	Exposure Time	Temp.	Av. Bac. Count	Control	(b) Sanitizing Sol'n.	Temp.	Av. Bac. Count	Control	(b) Sanitizing Sol'n.
	Trisodium Phosphate at a Concentration of ¼ Oz. per Gallon of Sanitizing Solution								
1– 5,000	1 min.	82° F.	5	149,760	0	84° F.	40	32,000	0
	2 "	"	25	"	0	"	5	"	0
	3 "	"	65	"	0	"	15	"	0
1– 7,500	1 "	"	20	"	0	"	45	"	0
	2 "	"	10	"	0	"	0	"	0
	3 "	"	50	"	0	"	0	"	0
1–10,000	1 "	"	10	"	0	"	5	"	0
	2 "	"	5	"	0	"	15	"	0
	3 "	"	0	"	0	"	80	"	0
1–12,500	1 "	"	20	"	0	"	15	"	0
	2 "	"	0	"	0	"	15	"	0
	3 "	"	0	"	0	"	100	"	0
	Hexa Meta Phosphate at a Concentration of ¼ Oz. per Gallon of Sanitizing Solution								
1– 2,500	1 min.	84° F.	5	46,080	0				
	2 "	"	15	"	0				
	3 "	"	10	"	0				
1– 5,000	1 "	"	65	40,000	0	82° F.	5	46,080	
	2 "	"	30	"	0	"	0	"	
	3 "	"	20	"	0	"	5	"	
1– 7,500	1 "	"	10	"	0				
	2 "	"	10	"	0				
	3 "	"	0	"	0				
	Soap Powder at a Concentration of ¼ Oz. per Gallon of Sanitizing Solution								
1– 2,500	1 min.	82° F.	10	3,000	0	84° F.	5	5,120	
	2 "	"	15	"	0	"	0	"	
	3 "	"	5	"	0	"	0	"	
1– 5,000	1 "	82° F.	4,800	6,400	5	"	5	"	
	2 "	"	35		5	"	5	"	
	3 "	"	5		5	"	20	"	
1– 7,500	1 "	"	35		5	"	15	5,760	
	2 "	"	10		5	"	10	"	
	3 "	"	(c)		5	"	10	"	
Soap Sol'n	1 "	89°F.	34,560	46,080	37				
only—¼	2 "	"	25,920	"	37				
oz./gal.	3 "	"	17,280	"	37				

(a) Alkyl-dimethyl-benzyl-ammonium-chloride
(b) Alkyl-dimethyl-benzyl-ammonium-chloride solution
(c) Accidentally contaminated

luted and in dilutions of 1–10 and 1–100 respectively, were planted on agar and in lactose broth fermentation tubes to determine bacteria load. In all instances, control tumblers were smeared with the same contaminants as used to determine the bactericidal values of the sanitizing solution, then swabbed without exposure to the chemical. Initial bacteria counts were also made of the various contaminants to assure prolific growth before use.

Keeping in mind actual conditions existent in food and beverage establishments, we examined the bactericidal action of this chemical in the presence of various detergents that would normally gain access to the sanitizing solution by carry-over from the wash water. The three detergents, trisodium phosphate, hexa-meta-phosphate, and soap (powdered), in the concentrations studied, do not appreciably affect the potency of alkyl-dimethyl-benzyl-ammonium-chloride as will be observed in Table 2.

To determine the action of alkyl-dimethyl-benzyl-ammonium-chloride in the presence of butter fat (Table 3) and lipstick (Table 4) deposited upon tumblers, two types of experiments were performed. In the case of butter fat, heavy sour cream inoculated with feces was smeared on tumbler rims under the same conditions as described. Table 3 indicates that the sanitizing solution at tap water temperature (54° F.) was ineffective, but when the temperature was increased to 114°F., the efficiency was increased to a remarkable degree.

Two types of lipstick were used, one having a heavy, waxy base with a high pigment load, the other having a light creamy base containing dye. Various individuals applied the stick to the lips, smeared saliva over the entire waxed lip with the tongue and contaminated sterile tumblers by pressing the lips against the rim in the manner of drinking. Of the tumblers contaminated, one was used as a control; the others were immersed in a solution of alkyl-dimethyl-benzyl-ammonium-chloride 1:5,000 for 1 minute at 74°F. Table 4 shows that the heavy, waxy lipstick evidently protected any organisms present inasmuch as the controls also were negative. The other lipstick, however, showed

TABLE 3

Laboratory Tests

The Bactericidal Action of Alkyl-dimethyl-benzyl-ammonium-chloride at Various Concentrations and Time Intervals Using Heavy Cream Inoculated with Feces as the Contaminant

(a) Chemical Concen.	Exposure Time
1– 2,500	1 min.
	2 "
	3 "
1– 5,000	1 "
	2 "
	3 "
1– 7,500	1 "
	2 "
	3 "
1–10,000	1 "
	2 "
	3 "

Temp.	Av. Bac. Count	Control	(b) Sanitizing Sol'n.
56° F.	5	370	0
"	5	"	0
"	15	"	0
"	5	320	0
"	0	"	0
"	0	"	0
"	5	"	0
"	0	"	0
"	0	"	0

Temp.	Av. Bac. Count	Control	(b) Sanitizing Sol'n.
114° F.	0	86,400	0
"	15	"	0
"	20	"	0
"	0	"	0
"	20	"	0
"	10	"	0
"	175	"	1
"	10	"	1
"	10	"	1

TABLE 4

The Bactericidal Action of Alkyl-dimethyl-benzyl-ammonium-chloride on Organisms Associated with Lipstick Deposits upon Tumblers

Chemical Concen.	Exposure Time	Temp.	Average Bac. Count per Rim Waxy Stick	Control	Average Bac. Count per Rim Indelible Stick	Control
1–5,000	1 min.	79° F.	10	0	0	850
"	"	"	10	0	0	850
"	"	"	30	0	20	850
"	"	"	100	3,760	100	960
"	"	"	125	5,760	80	960
"	"	"	(c)			
"	"	"	40	470	80	960
"	"	"	65	470		
	"	"	85	470		

(a) Alkyl-dimethyl-benzyl-ammonium-chloride
(b) Alkyl-dimethyl-benzyl-ammonium-chloride solution
(c) Accidentally contaminated

TABLE 5

Field Tests

Bacteria Counts of Tumblers Washed in Hot Soapy Water and Sanitized in a 1–5,000 Solution of Alkyl-dimethyl-benzyl-ammonium-chloride

Establishment	*Bacteria per cc. Wash Water*	*Exposure Time*	*Av. Bacteria per Tumbler 2 Tumblers Examined*	*Sanitizing Sol'n Bacteria per cc.*
No. 10 Restaurant	5,120	1 min.	60	1
	"	2 "	15	1
	"	3 "	40	1
	"	1 "	40	3
	"	2 "	20	3
	"	3 "	5	3
	2,240	1 "	40	0
	"	2 "	40	0
	"	3 "	30	0
	1,890	1 "	35	3
	"	2 "	40	3
	"	3 "	25	3
	10,240	1 "	15	3
	"	2 "	20	3
	"	3 "	10 — 1 plate	3
	"	1 "	25	1
	"	2 "	30	1
	"	3 "	40	1
Establishment				
No. 11 Restaurant	5,760	1 "	45	0
	"	2 "	10	0
	"	3 "	45	0
	7,424	1 "	90	1
	"	2 "	75	1
	"	3 "	80	1
	8,640	1 "	30	2
	"	2 "	15	2
	"	3 "	20	2
	7,500	1 "	20	1
	"	2 "	20	1
	"	3 "	15	1
	3,840	1 "	25	2
	"	2 "	30	2
	"	3 "	30	2
	"	1 "	40	0
	"	2 "	30	0
	"	3 "	30	0

substantial bacterial counts whereas the treated tumblers showed a comparatively negligible growth.

Having established that a solution of alkyl-dimethyl-benzyl-ammonium-chloride 1:5,000, sanitized utensils to a remarkable degree in the laboratory under the most rigid conditions, this agent was then subjected to tests in the field to note its practical value. The chemical was used in the final rinsing compartment in taverns and restaurants at the concentration noted.

FIELD

The coöperation of two restaurants and two taverns was solicited to establish the practicability of this product when used as a final rinse in the washing procedure. One part alkyl-dimethyl-benzyl-ammonium-chloride to 5,000 parts of cold water was found to be the most practical dilution for this purpose. It will be noted in Table 1 that alkyl-dimethyl-benzyl-ammonium-chloride is bactericidal up to 1–15,000. However, in order to minimize the possibility of reduction in bactericidal efficiency due to dilution and accumulation of organic matter carried over on utensils, and to establish a minimum exposure interval, the higher concentration was decided upon as best for use under commercial conditions. Samples of the wash water and rinse water (sanitizing solution) were plated in each test. The swabbing

TABLE 6

Field Tests

Bacteria Counts of Tumblers Rinsed in Cold Clear Water and Sanitized in a 1–5,000 Solution of Alkyl-dimethyl-benzyl-ammonium-chloride

Establishment	*Bacteria per cc. Wash Water*	*Exposure Time*	*Av. Bacteria per Tumbler 2 Tumblers Examined*	*Sanitizing Sol'n Bacteria per cc.*
No. 13 Tavern	56	1 min.	0	0
	"	2 "	25	0
	"	3 "	10	0
	640	1 "	0	1
	"	2 "	15	1
	"	3 "	10	1
	2,560	1 "	25	0
	"	2 "	20	0
	"	3 "	20	0
	"	1 "	65	5
	"	2 "	25	5
	"	3 "	20	5
Establishment No. 20 Tavern	No Wash Water Used	1 min.	180	0
		2 "	(c)	0
		3 "	20	0
		1 "	(c)	4
		2 "	110	4
		3 "	95	4
		1 "	15	3
		2 "	20	3
		3 "	5	3
		1 "	10	2
		2 "	15	2
		3 "	180	2
		1 "	100	0
		2 "	60	0
		3 "	35	0
		1 "	30	0
		2 "	30	0
		3 "	20	0

(c) Accidentally contaminated

technic employed was as described by Krog. The rinse solution was prepared at the start of every test so that control of initial concentration could be assured.

In the restaurants, two-compartment metal sinks were used in washing. One contained hot, soapy water at the usual restaurant dish-washing temperature of approximately 110°F., the other, alkyl-dimethyl-benzyl-ammonium-chloride 1:5,000 solution in which the tumblers were immersed for various times.

Dish-washing was continued with no change in the routine technic. At unappointed intervals, over several weeks, tumblers were taken from the rinse solution, the time of exposure accurately noted and cultured by the conventional rim test method (See Table 5).

At the taverns where utensils are not generally washed but merely rinsed after each use, the tumblers were placed in the sanitizing solution immediately after being subjected to the usual bar-keepers' rinse. The tumblers in one tavern, designated in Table 6 as No. 20, were submerged for various time intervals in alkyl-dimethyl-benzyl-ammonium-chloride solution without preliminary cold water rinse. This procedure at No. 20 is evidently the cause for a few counts in excess of 100 colonies.

It will be noted in Tables 5, 6, and 7 that the bacteria count per cc. of sanitizing solution is negligible after prolonged use under commercial conditions.

On the basis of the data collected

TABLE 7

Field Tests

Stability Time Study and Bacteriological Examination Results of Alkyl-dimethyl-benzyl-ammonium-chloride Sanitizing Solutions in Use at Several Eating and Drinking Establishments

Establishment	Initial Concen.	Concentration of Alkyl-dimethyl-benzyl-ammonium-chloride in Sanitizing Solution After: 1 Hour	2 Hours	3 Hours	4 Hours	5 Hours
No. 10 Restaurant	1–5,000	1–5,000	1–7,500	1–10,000	1–10,000	
21 "	1–5,000	1–5,000	1–5,000	1– 5,000	1– 7,500	
13 Tavern	1–5,000	1–5,000	1–5,000	1– 5,000	1– 5,000	1–6,000
20 "	1–5,000	1–5,000	1–7,500	1– 7,500	1– 7,500	1–7,500

Establishment	Bacteria Count per cc. of Sanitizing Solution After Being Used: 1 Hour	2 Hours	3 Hours	4 Hours	5 Hours
No. 10 Restaurant	0	0	0	0	0
21 "	0	0	0	0	0
13 Tavern	0	0	0	0	0
20 "	0	0	0	0	0

during the field investigation, it appears that alkyl-dimethyl-benzyl-ammonium-chloride is a satisfactory sanitization agent for public eating and drinking utensils since a utensil with a bacterial count of less than 100 colonies per tumbler rim is generally accepted as properly sanitized.

STABILITY

The stability of alkyl-dimethyl-benzyl-ammonium-chloride was also observed in the laboratory and field, as this is of great importance. The laboratory tests demonstrated that none of the chemical was dissipated during the investigation. Since a limited number of contaminated tumblers passed through any given solution in the laboratory, this particular study is of no value in the determination of stability. However, the field investigation showed that the chemical is very stable over long periods of time and under heavy usage, another favorable characteristic for the practical sanitization of eating and drinking utensils.

To determine the presence and concentration of alkyl-dimethyl-benzyl-ammonium-chloride in the rinse solution, a colorimetric test was employed, based upon the fact that the chemical combines with various acidic dyes to form colored compounds. These colored compounds are extractable from alkaline solution by ethylene dichloride. The test is simple and specific, since soap, ammonia, ethanolamines, sodium phosphates, and temperature do not interfere. Place in a test tube (standard colorimetric) 1 cc. of the solution to be tested. Add 5 cc. of N/1 NaOH and 5 cc. of ethylene dichloride. Close tube with rubber stopper and shake well. Add 1 cc. 0.04 per cent brom-thymol blue (Clark's indicator) and shake well again. In the absence of alkyl-dimethyl-benzyl-ammonium-chloride, the lower phase (ethylene dichloride) will be colorless. If the chemical is present, the lower phase will be colored blue, the depth of the color being proportional to the quantity of the chemical present. The La Motte Chemical Products Company has developed standard color comparator tubes which may be satisfactorily used in this colorimetric determination. The test may be made quantitative by adding the brom-thymol blue solution, two drops at a time and shaking after each addition. In this method, the blue color will be taken out of the aqueous layer by the organic solvent layer until all the chemical present has combined with the indicator. After this point has been reached, the aqueous layer will retain the added blue color. This makes for a definite end-

point, easily observed. Each cc. of 0.04 per cent brom-thymol blue corresponds to 0.47 mg. alkyl-dimethyl-benzyl-ammonium-chloride.

SUMMARY AND CONCLUSIONS

1. A 1:5,000 solution of alkyl-dimethyl-benzyl-ammonium-chloride demonstrates marked bactericidal action against bacteria found on eating and drinking utensils.

2. Detergents and soaps have little or no effect on the potency of this compound in two or three compartment washing procedures.

3. Stability of the chemical is favorable to the application studied herein. Concentrations can be easily checked colorimetrically in the field by inspectors.

4. Temperature does not affect the stability or bactericidal efficiency adversely above the temperature of 70° F.

5. A 1 minute exposure is apparently sufficient to reduce surviving bacteria to below 100 colonies per tumbler rim.

METHOD

From the foregoing, a satisfactory method for sanitizing dishes by hand in restaurants and soda fountains follows:

1. Wash off organic debris with running water.

2. Wash dishes by hand in hot water (120° F.) containing soap or other detergent.

3. Place dishes in alkyl-dimethyl-benzyl-ammonium-chloride rinse water for at least 1 minute.

4. Remove and air dry.

No after rinse is required as alkyl-dimethyl-benzyl-ammonium-chloride is odorless, tasteless and non-toxic in the concentrations used.

In taverns where glasses are not washed in soap and hot water after each individual use, the following procedure is recommended:

Cold water rinse followed by 1 minute immersion in alkyl-dimethyl-benzyl-ammonium-chloride at a 1–5,000 concentration.

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Prevalence of Pneumococcus Carriers: Specific Types in Epidemic and Non-Epidemic Areas*

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THE pneumonias have generally been considered endemic, rather than epidemic diseases, although references to epidemics of pneumonia may be found even in the early medical literature.[1, 2] In recent years, epidemics of pneumonia due to specific types of pneumococci have been observed with increasing frequency, and certain types have been shown to be more frequently associated with epidemic pneumonia than others. A number of institutional outbreaks of pneumonia due to Type I [3] and Type II [4, 5] have been reported. Community outbreaks in which Type I infection predominated have been observed by Sydenstricker and Sutton [6] in Maryland in 1917; more recently in Germany by Gundel [7]; and by Gilman and Anderson in Massachusetts.[8] An explosive epidemic of colds, bronchitis, and pneumonia in a child-caring institution was reported by Schroder and Cooper [9] in 1930, in which Type V pneumococcus infection apparently predominated.

As a result of the emphasis placed upon early typing and specific serum treatment in pneumonia as a part of the control program in New York State during recent years, there has been a marked increase in the proportion of cases typed, and the number of types for which sputum specimens have been tested has increased in most laboratories. During 1938, all approved laboratories in the state have been supplied with diagnostic sera for at least Types I, II, V, VII, and VIII.

Table 1 shows comparative prevalence of pneumonia of the common types during 1938 in certain counties in the state, in which typing was reasonably complete, and in which laboratory facilities were adequate. In almost all counties Type I infection predominated. There was considerable variation in the proportion of typed cases found to be due to Type V. The counties listed in Table 1 are roughly in geographical order, from the western to the eastern part of the state, and the two counties in which over 20 per cent of the typed cases were Type V are adjacent and located at approximately the geographical center of the state. The concentration of Type V pneumonia in this central area was quite marked during 1938.

* Read at a Joint Session of the Health Officers and Epidemiology Sections of the American Public Health Association at the Sixty-eighth Annual Meeting in Pittsburgh, Pa., October 18, 1939.

TABLE 1

Pneumonia and Pneumococcus Type Incidence in Certain Counties New York State—1938

County	Total Reported Cases of Pneumonia	Cases Typed		Incidence of Certain Types: I		II		V		VII		VIII	
		Number	Per cent	Number	Per cent Typed Cases	Number	Per cent Typed Cases	Number	Per cent Typed Cases	Number	Per cent Typed Cases	Number	Per cent Typed Cases
Cattaraugus	197	77	39.1	14	18.2	4	5.2	6	7.8	2	2.6	4	5.2
Livingston	175	54	30.8	12	22.2	..	...	1	1.8	9	16.7	2	3.7
Steuben	360	172	47.8	46	26.7	8	4.6	19	11.0	12	7.0	12	7.0
Onondaga *	327	171	52.3	32	18.7	3	1.8	35	20.5	11	6.4	8	4.7
Madison	154	75	48.7	7	9.3	2	2.7	22	29.3	2	2.7	2	2.7
Otsego	189	117	61.9	30	25.6	3	2.6	8	6.8	9	7.7	6	5.1
Fulton	124	50	40.3	10	20.0	7	14.0	7	14.0	2	4.0	5	10.0
St. Lawrence	247	108	43.7	32	29.6	5	4.6	8	7.4	12	11.1	7	6.5
Essex	84	36	42.8	14	38.9	..	...	2	5.6	5	13.9	5	13.9
Broome	785	416	53.0	101	24.3	6	1.4	5	1.2	34	8.2	17	4.1
Greene	104	51	49.0	10	19.6	1	2.0	4	7.8	4	7.8	2	3.9
Westchester	1,583	496	31.3	137	27.6	28	5.6	19	3.8	28	5.6	36	7.2

* Exclusive of Syracuse

Type I pneumococci have been most frequently encountered in cases of pneumonia in the state as a whole; Type II pneumococci have been found in a relatively small proportion of the typed cases; Type V pneumococci have been encountered with greater relative frequency in New York State than in most series of cases reported. There has been considerable variation in the prevalence of these types in different areas, and in many instances this has apparently been due to localized epidemics of a homologous type.

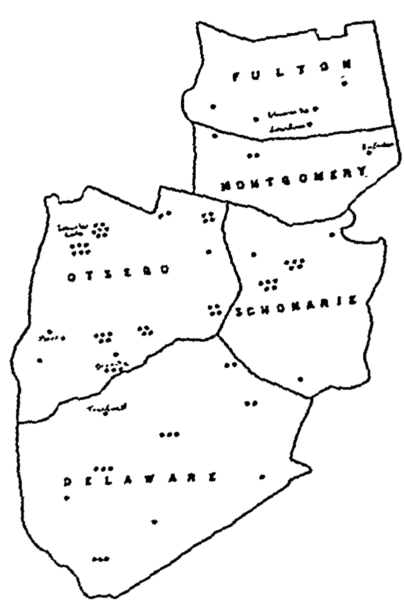
The spot maps show the grouping of cases of pneumonia according to type in an area in which detailed observations were made. Maps I, II, and III show the distribution of Types I, II, and V pneumonia respectively in 5 counties included in two state health districts. The localization by types is apparent. Epidemic areas are evident, especially for Type II and Type V. This localization is not correlated with density of population.

In view of the definite grouping of certain types of pneumococcus pneumonia, it has been considered desirable to make detailed epidemiological and bacteriological studies in areas in which epidemics occur. An epidemiological unit was organized, including a portable field laboratory, and put into service in January, 1939.

Field studies were carried out in the following three isolated communities in New York State. The first survey

MAP I

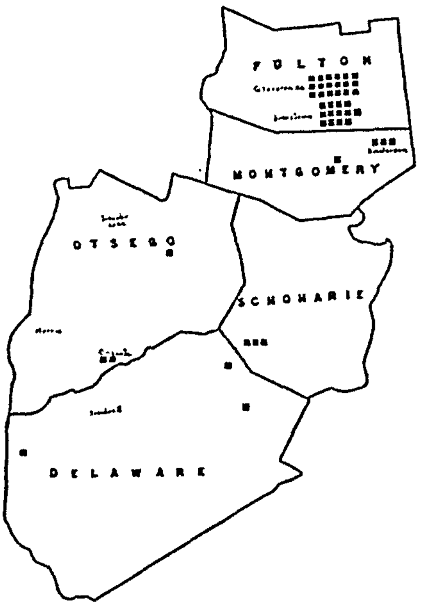
DISTRIBUTION OF TYPE I PNEUMOCOCCUS PNEUMONIA
JULY 1938 — JULY 1939



MAP II

DISTRIBUTION OF TYPE II PNEUMOCOCCUS PNEUMONIA

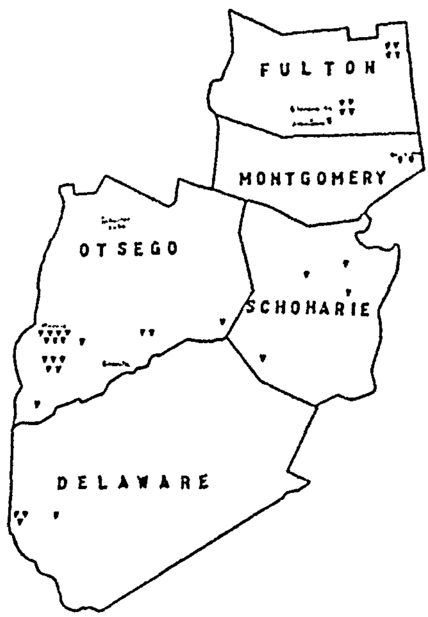
JULY 1938 — JULY 1939



MAP III

DISTRIBUTION OF TYPE V PNEUMOCOCCUS PNEUMONIA

JULY 1938 — JULY 1939



was made in Treadwell, with a population of 280, located in Delaware County midway between the west branch of the Delaware and the Susquehanna Rivers, approximately 60 miles northeast of Binghamton, and 15 miles east of Oneonta. It is located in the hills where travel in the winter is difficult.

Morris, having a population of approximately 400, is located about 30 miles west of Treadwell. It is 15 miles northwest of Oneonta.

Cannonsville, a village of 320 population, is located on the west branch of the Delaware River, 30 miles southwest of Treadwell. There were no industries in operation in any of the three villages and none was located on a main highway or on a railroad.

Cultural surveys were carried out in each of the study areas. Nasal cultures were obtained by passing a sterile swab through each nostril into the nasopharynx. A second swab was used for obtaining the throat culture, and special care was observed to swab as much of the oral pharynx as possible, including the tonsils, and especially the crypts of the tonsils if present. Both swabs were inoculated directly into Avery's blood broth. During the early part of the first study, separate broth tubes were used for the nose and throat.

Cultures were transported to the field laboratory for incubation, with a delay of not more than 2 to 5 hours. After incubation for 6 hours, all cultures were tested for pneumococci by the Neufeld method and by mouse inoculation. All identifications were confirmed either by the Otsego County Laboratory or by the Division of Laboratories and Research of the State Department of Health.

In Treadwell, the field laboratory completed the identification of Type I pneumococci, and in Morris of Type V. In Cannonville the field laboratory completed the identification of both Type I and Type V pneumococci. All other strains isolated were identified in the Division of Laboratories and Research or in the Otsego County Laboratory.

TREADWELL STUDY

In December, 1938, Dr. George M. Mackenzie of Cooperstown had undertaken a study in the isolated village of Schuyler Lake in the northwest corner of Otsego County, where an epidemic prevalence of Type I pneumococcus pneumonia was occurring. A preliminary carrier survey made by him showed a high prevalence of carriers of Type I pneumococci among the residents. In order to compare the prevalence of carriers of various types of pneumococci in isolated villages, it seemed desirable to undertake a carrier survey in a village in which no pneumonia had occurred for a considerable time. Treadwell was selected because no known cases of pneumonia had occurred during the preceding 8 months, and no known Types I, II, and V pneumonia had occurred in the village for at least 2 years. Any contact between residents of Schuyler Lake and Treadwell seemed unlikely because of their wide separation.

A survey in this area was started January 23, 1939, and completed March 21, and while no unusual prevalence of respiratory infection had been noted, preliminary tabulation of the first bacteriological findings revealed the startling fact that approximately 25 per cent of the individuals cultured were carriers of Type I pneumococcus.

In the course of the study, it was learned that on January 31 a resident of Treadwell had become ill and was removed to a hospital in a village approximately 12 miles distant. Inquiries made it clear that this patient had suffered from lobar pneumonia, but unfortunately his sputum was not typed, nor was blood culture taken. Nasal and throat cultures obtained from the patient approximately 3 weeks after onset contained Type I pneumococci. Repeated culturing showed him to be a persistent carrier of Type I and mouse protection tests showed that his serum contained antibodies specific for Type I in high titer. It seems reasonable to assume, therefore, that this patient, who became ill January 31, suffered from Type I pneumococcus pneumonia. It is of special interest that of 34 individuals in Treadwell cultured previous to the onset of illness in this case, 11, or approximately 30 per cent, were found to be carriers of Type I pneumococcus, indicating a high prevalence of Type I infection in the area preceding the onset of the first case of pneumonia.

A second case of pneumonia had onset February 5; this was a typical case of lobar pneumonia, and sputum typed early in the illness showed Type I pneumococcus. Two other cases occurred during the spring of 1939, one believed to be due to Type XXVIII pneumococcus, and the other to "streptococci." These 4 cases of pneumonia, in two of which Type I was believed to have been the etiological agent, occurred during 3½ months. While this represents an attack rate in excess of that prevailing in Otsego County or similar areas, it would not generally have been regarded as constituting an epidemic. The care with which the survey was made would seem to justify the conclusion that there were no other cases.

Cultures were obtained from 191 persons residing in the village, and Type I pneumococcus was definitely the predominant type encountered in Treadwell. As shown in Table 2, 32, or 17 per cent, of the 191 individuals cultured were found to be carriers of this microörganism. Twelve of the individuals cultured were household contacts of the 2 cases of Type I pneumococcus pneumonia and of these, 5 were found to be carriers of Type I pneumococcus. Seventeen different types were isolated, as shown in Table 3. Other than Type I, Types XV and XXIX were the most frequently encountered. Twenty-two per cent of those cultured were carriers

TABLE 2

Results of Nose and Throat Cultures among Persons Cultured, Exclusive of Cases, in Treadwell, N. Y., January 23 to March 21, 1939

Results of Culture	Number of Persons: Under 20 Years	20 Years and Over	Total	Per cent of Total: Under 20 Years	20 Years and Over	Total
Type I pneumococcus	22	10	32	33.8	7.9	16.7
All other types	22	20	42	33.8	15.9	22.0
Total positive	44	30	74	67.7	23.8	38.7
Total negative	21	96	117	32.3	76.2	61.3
Individuals cultured *	65	126	191	100.0	100.0	100.0

* There were 8 multi-type individuals

TABLE 3

Prevalence of Carriers of Pneumococci in Treadwell, N. Y., as Shown by Survey, January 23 to March 21, 1939, According to Age and Type

Type of Pneumococcus	Number of Carriers: Under 20 Years	20 Years and Over	Total
I	22	10	32
XV	7	2	9
XXIX	2	5	7
VI	1	3	4
XIX	3	1	4
III	3	..	3
IV	2	1	3
XVII	..	2	2
XVIII	2	..	2
XXI	..	2	2
VIII	1	..	1
IX	..	1	1
XI	..	1	1
XIII	..	1	1
XIV	1	..	1
XX	1	..	1
XXVIII	..	1	1
XXXI	..	1	1
Not classified	4	2	6
Total positive	49	33	82

of types other than Type I. The prevalence of both the predominating type and all other types was higher in young persons.

MORRIS STUDY

During the study in Treadwell, it was noted that an unusual prevalence of Type V pneumococcus pneumonia was occurring in the village of Morris. Investigation revealed that 21 cases of pneumonia had occurred in this village or within a radius of 7 miles during the period November 24, 1938, to February 28, 1939. As shown in Table 4, of these 21 cases, sputum from 18 had been typed and in 14 Type V pneumococcus had been found. The population of the village and of the area included within the 7 mile radius in which the cases occurred was approximately 2,000. The occurrence of 14 cases of Type V pneumonia in this group obviously constituted an epidemic.

Epidemiological histories were obtained from 400 individuals, exclusive of cases, and of these, 272 were cultured between February 7 and March 21. The survey procedure in this area differed from that in either Treadwell or Cannonsville in that 3 different groups were cultured; first, family contacts of cases of Type V pneumonia; second, extra-familial contacts of these case families which were for the most part neighbors having frequent associa-

TABLE 4

Cases of Pneumonia, Morris, N. Y., and Vicinity

Winter of 1938–1939

Case	Age	Sex	Date of Onset	Type
R.S.	12	M	11/24	Not typed
D.V.	20	M	11/30	V
B.B.	6	F	12/1	Not typed
H.W.	47	M	12/13	V and VIII
J.D.	10	M	12/27	V
C.G.	37	M	1/15	V
D.P.J.	13	M	1/16	V
A.G.	64	M	1/17	XXIX
W.S.	56	M	1/19	V
L.R.	2	F	1/21	V
E.V.W.	74	F	1/24	Not typed
B.C.	5	F	1/26	V
C.J.	8	M	1/27	V
J.N.	6	M	1/29	XVII
V.H.	46	M	2/6	V
R.D.	47	M	2/7	V
M.E.F.	78	F	2/16	IX
C.P.	51	M	2/16	V
G.J.	34	F	2/24	V
W.C.	42	M	2/26	III
S.J.	59	F	2/28	V

TABLE 5

Prevalence of Carriers of Pneumococci in Morris, N. Y., and Vicinity as Shown by Survey, February 7 to March 21, 1939, According to Age and Type

Type of Pneumococcus	Number of Carriers: Under 20 Years	20 Years and Over	Total
III	4	7	11
V	9	2	11
VIII	3	4	7
XIX	5	2	7
VI	4	2	6
XXIX	3	2	5
XVII	4	..	4
XVI	1	2	3
XVIII	2	1	3
XI	2	..	2
XIV	2	..	2
XXIII	1	1	2
XXVII	2	..	2
I	1	..	1
VII	..	1	1
XV	1	..	1
XXII	1	..	1
XXVIII	1	..	1
Not classified	4	3	7
Total positive	50	27	77

tion with the case family, although direct contact with the case did not always occur; and third, a random sample of the population of the village. The sample of the population was obtained by taking cultures from alternate individuals named on the family rosters.

Type V and Type III predominated in this area and were of equal frequency. Eleven carriers of each of these types were found. In view of reported findings in carrier surveys, this number of carriers of Type III was not considered remarkable. Only one carrier of Type I pneumococcus and no carriers of Type II were encountered in the study. As shown in Table 5, 17 types other than Type V were isolated.

Table 6 shows the results of culturing according to predominating type (Type V) and other types isolated by age groups. It may be noted that the proportion of carriers of Type V, as well as of all other types, was higher in the younger age group. In the entire group cultured, only 4.4 per cent carried the predominating pneumococcus (Type V) whereas in Treadwell, 16.7 per cent were carriers of the predominating microörganism (Type I).

Table 7 shows the prevalence of

TABLE 6

Results of Nose and Throat Cultures Among Persons Cultured, Exclusive of Cases, in Morris, N. Y., and Vicinity, February 7 to March 21, 1939

Results of Culture	Number of Persons: Under 20 Years	20 Years and Over	Total	Per cent of Total: Under 20 Years	20 Years and Over	Total
Type V pneumococcus	9	2	11	9.1	1.3	4.4
All other types	38	24	62	38.4	15.8	24.7
Total positive	47	26	73	47.5	17.1	29.1
Total negative	52	126	178	52.5	82.9	70.9
Individuals cultured *	99	152	251	100.0	100.0	100.0

* There were 3 multi-type individuals, one of whom was positive for three types.

TABLE 7

Prevalence of Carriers of Type V Pneumococcus According to Age and Intimacy of Contact with Cases of Type V Pneumonia, Morris, N. Y., February 7 to March 21, 1939

Age	Number Cultured: Household Contacts	Extra Household Contacts	No Contact	Number Positive: Household Contacts	Extra Household Contacts	No Contact	Per cent Positive: Household Contacts	Extra Household Contacts	No Contact
0-19	33	13	53	7	..	2	21.2	...	3.7
20+	31	43	78	1	1	..	3.2	2.3	...
Total	64	56	131	8	1	2	12.5	1.8	1.5

Type V carriers in household contacts as compared with extra-familial contacts and in the random sample of the population of the village. The prevalence of carriers of Type V pneumococcus was distinctly higher in household contacts of cases of Type V pneumonia than in the other groups. The fact that the household contacts of cases were the first group cultured in Morris may have some bearing on the results of culture.

TABLE 8

Prevalence of Carriers of Pneumococci in Cannonsville, N. Y., as Shown by Survey, March 27 to April 13, 1939, According to Age and Type

	Number of Carriers		
Type of Pneumococcus	*Under 20 Years*	*20 Years and Over*	*Total*
VI	11	9	20
XI	2	7	9
XVIII	3	3	6
III	2	3	5
XXII	5	..	5
XIX	4	..	4
XXV	2	..	2
XIV	2	..	2
IV	..	1	1
VIII	..	1	1
XV	..	1	1
XX	1	..	1
XXI	1	..	1
XXIV	..	1	1
Not classified	2	2	4
Total positive	35	28	63

CANNONSVILLE STUDY

In a further attempt to obtain information as to the prevalence of carriers of pneumococci in an isolated village in which no cases of pneumonia had occurred recently, a survey was made in Cannonsville. Careful investigation revealed no evidence of any illness suggestive of pneumonia in the village or its vicinity from July 1, 1938, throughout the study. It is believed that the 307 persons from whom histories were obtained included almost every individual resident in the village at the time. In cultures from 199 individuals, 14 different types were isolated. As shown in Table 8, there were 20 carriers of Type VI pneumococci and 43 carriers of other types. Other than Type VI, Types XI and XVIII were the most frequently encountered. No carriers of Types I, II, V, or VII were found.

Table 9 shows the proportion of individuals cultured found to be carriers of Type VI and of all other types. It may be noted that 32 per cent of the individuals cultured were found to be carriers of some type of pneumococcus and that 10 per cent were found to be carriers of Type VI. Here, as in the other survey areas, the prevalence of carriers of pneumococci of all types was higher in younger individuals.

Table 10 compares the prevalence of carriers of all types of pneumococci in the three areas studied. The carrier rate was highest in Treadwell, especially in the age group under 20.

In Morris and Cannonsville, history was obtained as to the occurrence of upper respiratory illness during the 30 days preceding culture. Sixty-two per cent of the individuals interviewed in Morris gave a history of illness. The

TABLE 9

Results of Nose and Throat Cultures among Persons Cultured in Cannonsville, N. Y., March 27 to April 13, 1939

	Number of Persons			Per cent of Total		
Results of Culture	*Under 20 Years*	*20 Years and Over*	*Total*	*Under 20 Years*	*20 Years and Over*	*Total*
Type VI Pneumococcus	11	9	20	12.3	8.2	10.1
All other types	24	19	43	27.0	17.3	21.6
Total positive	35	28	63	39.3	25.5	31.7
Total negative	54	82	136	60.7	74.5	68.3
Individuals cultured	89	110	199	100.0	100.0	100.0

TABLE 10

Persons Cultured, Number and Per cent Found to Be Pneumococcus Carriers, by Age in the Three Study Areas

	Number Cultured			Number of Carriers			Carrier Rates Per cent			
Age	Treadwell	Morris	Cannonsville	Treadwell	Morris	Cannonsville	Treadwell	Morris	Cannonsville	Total
0–19	65	99	89	44	47	35	67.7	47.5	39.3	49.8
20+	126	152	110	30	26	28	23.8	17.1	25.5	21.6
Total	191	251	199	74	73	63	38.7	29.1	31.7	32.8

attack rate was higher in the group under 20 years of age.

Four cases of purulent otitis media were observed, 2 in cases of Type V pneumococcus pneumonia, 1 in an otherwise healthy carrier of Type V, and 1 in an individual whose throat culture was negative. Simple earache occurred in 13 persons: 2 cases of pneumonia, 1 Type V, and 1 untyped; 1 otherwise healthy carrier of Type V pneumococcus; 5 carriers of pneumococci of other types; and 5 individuals whose nose and throat cultures were negative for pneumococci.

History of recent respiratory illness was obtained less frequently in Cannonsville than in Morris. Thirty-eight per cent of those cultured had suffered from some mild upper respiratory illness in the 30 days preceding the culture. Three cases of acute suppurative otitis media occurred during this time, 1 in a carrier of Type III pneumococcus, and 2 in persons whose nose and throat cultures were negative for pneumococci. Four individuals suffered from simple earache, 2 of whom were found to be carriers of other than the predominating type, and 2 had negative nose and throat cultures.

Table 11 summarizes the prevalence of carriers of *all* types, according to age and history of illness in Morris and Cannonsville. Association of the carrier condition with illness seems to be indicated only in the younger age group.

Table 12 shows the prevalence of carriers of the predominating type of pneumococcus, and the prevalence of all other types according to age and prior illness. In Morris, the prevalence of carriers of the predominating type (Type V) was greater in those with prior illness in both age groups. In Cannonsville, the prevalence of carriers of the predominant type (Type VI) was higher in those with prior illness

TABLE 11

Number of Persons Cultured, and Per cent Found to Be Pneumococcus Carriers (All Types) According to Prior Respiratory Illness in Morris and Cannonsville

History of Respiratory Illness

	Number Cultured			Per cent Pneumococcus Carriers, All Types		
Place	Under 20 Years	20 Years and Over	All Ages	Under 20 Years	20 Years and Over	All Ages
Morris	73	83	156	50.7	16.9	32.7
Cannonsville	34	42	76	47.1	26.2	35.5

No History of Respiratory Illness

	Number Cultured			Per cent Pneumococcus Carriers, All Types		
Place	Under 20 Years	20 Years and Over	All Ages	Under 20 Years	20 Years and Over	All Ages
Morris	26	69	95	38.5	17.4	23.2
Cannonsville	55	68	123	34.5	25.0	29.3

TABLE 12

Pneumococcus Carrier Rates Per cent of Predominating Type and of All Other Types According to Age and Prior Respiratory Illness in the Three Study Areas

	Carrier Rates Per cent—Predominating Type					
	Under 20 Years		20 Years and Over		Total	
Place	History of Illness	No Illness	History of Illness	No Illness	History of Illness	No Illness
Morris	11.0	3.8	2.4	...	6.4	1.1
Cannonsville	26.5	3.6	7.1	8.8	15.8	6.5

	Carrier Rates Per cent—All Other Types					
	Under 20 Years		20 Years and Over		Total	
Place	History of Illness	No Illness	History of Illness	No Illness	History of Illness	No Illness
Morris	39.7	34.6	14.5	17.4	26.3	22.1
Cannonsville	20.6	30.9	19.0	16.2	19.7	22.8

only in the younger age group. There was very little difference in the prevalence of carriers of other than the predominating type in either Morris or Cannonsville, according to history of illness.

DURATION OF CARRIER STATE

An attempt was made to reculture all of the individuals, exclusive of cases, known to be carriers of Type I pneumococcus in Treadwell or of Type V pneumococcus in Morris. Repeated cultures were obtained from 31 of the 32 carriers of Type I pneumococcus in Treadwell. Twenty-two of these were found to continue to carry this type of pneumococcus for from 2 weeks to 3 months, and reculturing of 27 of the original 32 approximately 7 months later showed that 3 were carriers of Type I pneumococcus at that time. Figure 4 shows the duration of the carrier state of the Type I carriers as indicated by reculturing.

Repeated cultures were taken on the Type V carriers at Morris at intervals of approximately 2 weeks. In only 5

TABLE 13

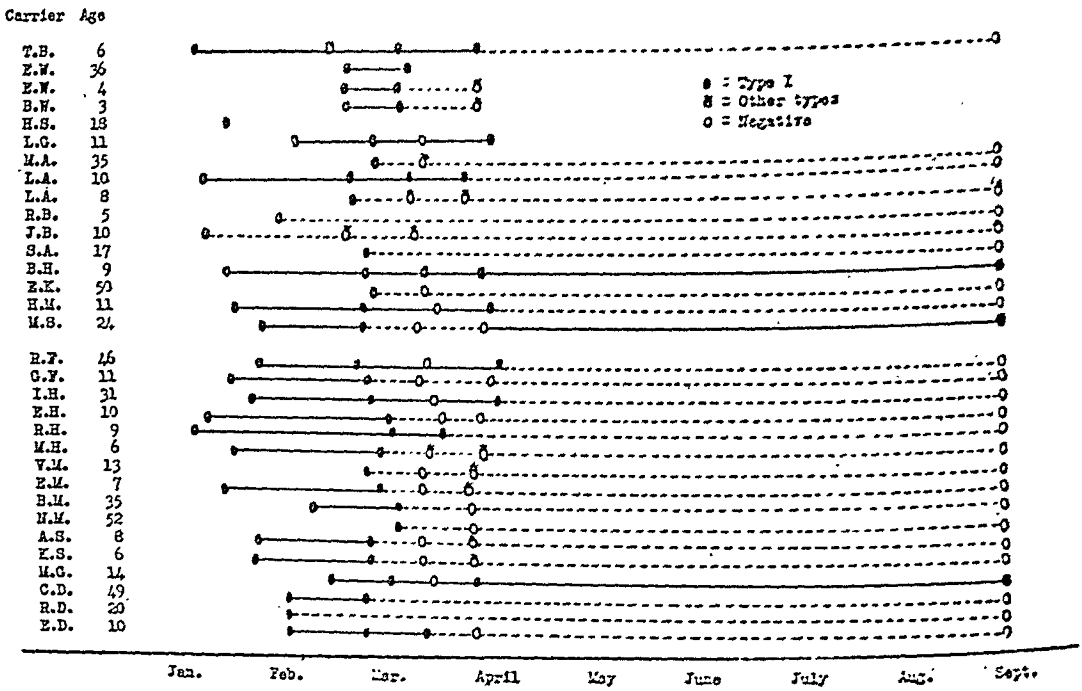
Pneumococcus Carrier Rates Per cent of Predominating Type and of Other Types According to Prior Respiratory Illness Corrected for Age*

	Corrected* Carrier Rates Per cent			
	Predominating Type		Other Types	
Place	History of Illness	No Illness	History of Illness	No Illness
Morris	5.8	1.5	24.4	24.2
Cannonsville	14.7	6.7	19.6	22.0

* Age correction made by using entire population cultured

Table 13 shows the prevalence of carriers of the predominant type and all other types in Morris and Cannonsville, corrected for age, using the entire cultured population of the three areas for age correction. In both Morris and Cannonsville, the prevalence of carriers of the predominating type was higher in those with a history of prior illness, but the differences are not statistically significant. There was no difference in the observed prevalence of carriers of types other than the predominant type according to history of illness in either area.

FIGURE 4—Duration of Type I Carrier State as shown by repeated culturing
Treadwell, N. Y.

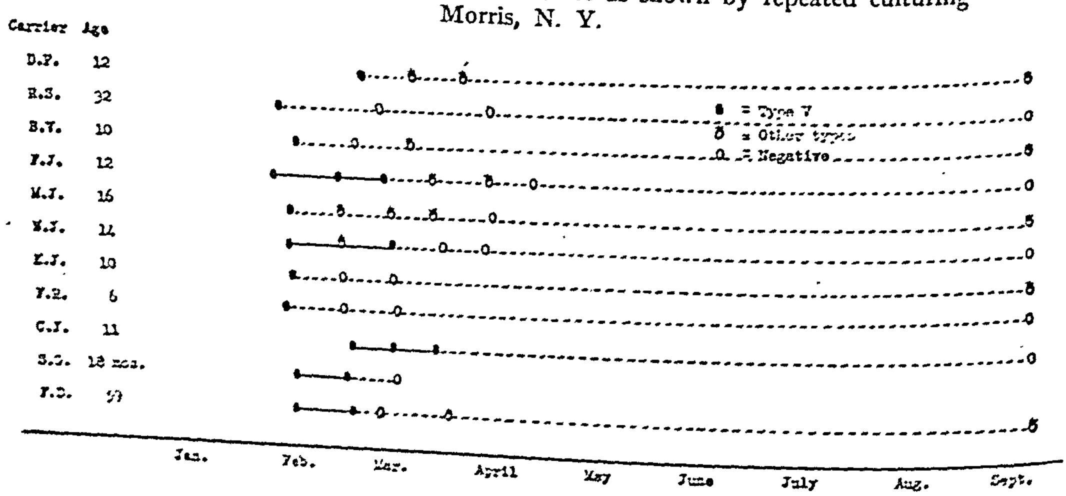


individuals were more than one positive culture obtained. The carrier condition was shown to have persisted for at least 2 weeks in 1, and for at least 1 month in 2 of the original carriers. Nine of the original carriers were recultured 6 months later, and none was found to be a carrier of Type V pneumococcus. Figure 5 shows the results of repeated culturing in persons found to be carriers of Type V during the survey. A comparison of these two series of observations shows a difference in the duration of the carrier state which apparently may vary according to type.

SUMMARY AND CONCLUSIONS

Pneumococcus carrier surveys were made in three isolated rural areas in New York State, in one of which at

FIGURE 5—Duration of Type V Carrier State as shown by repeated culturing
Morris, N. Y.



the time of the beginning of the study no cases of pneumonia had occurred for a considerable time, yet a high prevalence of carriers of Type I pneumococcus was found. Subsequent to the beginning of the study, 2 cases of Type I pneumonia occurred in this area. The prevalence of Type I pneumonia in this community could hardly be regarded as constituting an epidemic and yet a carrier prevalence was observed in the general population fully as high as or higher than that usually encountered among contacts to cases. Moreover, this marked prevalence of carriers of Type I pneumococci preceded the occurrence of the first case of pneumonia. No Type V carriers were discovered in this survey.

In the survey carried out in an area in which Type V pneumococcus pneumonia was present in epidemic proportions, more carriers of the homologous type of pneumococcus were found than of any type other than Type III, but these were confined almost exclusively to household contacts to known cases of Type V pneumonia. Only one carrier of Type I pneumococcus was found in this area.

A similar study in a third village in which no pneumonia had occurred for at least 6 months preceding the survey revealed no carriers of Type I or V pneumococci. Type VI was found to be the predominating type of pneumococcus in this area.

Respiratory illnesses other than pneumonia were more prevalent in the area in which Type V pneumonia was highly prevalent than in the area in which there were no cases of pneumonia. There was a slightly higher prevalence of carriers of pneumococci of the predominant type among persons in the younger age group who gave a history of respiratory illness other than pneumonia in both areas but these differences were not statistically significant.

The findings in these surveys seem to indicate that:

1. Infection with Type I pneumococcus may be widespread in the absence of a high prevalence of Type I pneumococcus pneumonia and a high prevalence of carriers of Type I pneumococcus may precede the occurrence of cases.

2. Epidemics of Type V pneumonia may not be associated with a continued high prevalence of carriers of this type of pneumococcus in the general population. In the Type V epidemic studied, the prevalence of carriers of the homologous type was limited primarily to household contacts of clinical cases of pneumonia. However, the fact that the household contacts were cultured first may have some bearing on this observation, especially in view of the evidence of a short duration of the Type V carrier state.

3. There may be a relatively high prevalence of carriers of Type VI pneumococci in the absence of pneumonia due to this type.

NOTE: The authors wish to acknowledge their indebtedness to the members of the staff of the Otsego County Laboratory and the Division of Laboratories and Research of the New York State Department of Health. We are especially indebted to Dr. George M. Mackenzie of the Otsego County Laboratory and Dr. A. H. Harris of the Division of Laboratories and Research of the New York State Department of Health for the detailed bacteriological study of cultures obtained in the surveys. We also wish to express our appreciation to Dr. George H. Ramsey for helpful suggestions in the analysis of the data.

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The Cost of Slums

THE cost of slums as noted in a recent publication of the United States Housing Authority:

A Hartford study showed that slum areas occupying a tenth of the area of the city house a fourth of the city's population. From these slum areas came 51 per cent of all tuberculosis cases, 57 per cent of all juvenile delinquency, and 62½ per cent of all arrests for adult delinquency.

This is what a study made in Cleveland showed:

Area	*Per Capita Cost for Fire Protection*	*Per Capita Cost for Police Protection*	*Per Capita Cost for Public Health Work*
One large slum area	$18.27	$11.50	$2.02
Rest of City	2.74	4.20	0.60

U. S. Municipal News, 7, 4 (Mar. 1), 1940.

Immunization against Pneumonia*

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THE statement by the late Sir William Osler that pneumonia is the king of all diseases, killing the same number from year to year despite any form of treatment, has remained true until the last decade. Since the improvement of antipneumococcus serum and its more accurate standardization to insure therapeutic doses, and more recently the use of sulfapyridine—really a synthetic antibody—there is promise of a great reduction in the mortality rate in the general population. However, this successful program for the cure of this disease will not conceivably have a bearing upon incident rate. Up to the present, no measure has proved itself adequate to reduce this rate satisfactorily. This is true despite improvement of sanitary conditions, advance in knowledge of adequate diet—especially in relationship to the use of vitamins—and other measures which tend to improve the health of the individual. Yet in some other infectious diseases, such as tuberculosis and scarlet fever, there has been a steady decrease in incidence and severity of the diseases not accounted for by any single measure. It is this constant pneumonia incident rate which makes it seem worth while to undertake anew an evaluation of active immunization as a prophylactic measure.

In experiments on active immunization in the past, whole-cell polyvalent vaccine in some form was used as an antigen. However, such studies as those of Maynard,[1] Lister,[2] Cecil and Austin,[3] Lister and Ordman,[4] and others, indicate the possibility of making a significant reduction in incidence. This reduction was reported by many investigators to be from 25 per cent to as high as 75 per cent. In taking up the problem again, the antigen employed is an antigenic polysaccharide. This substance has been chosen since it has been shown to contain more immunizing doses than the cells from which it was derived, and because it is soluble, stable, easily sterilized and standardized, and free from reaction-producing characteristics. Assuming that this antigen is as good as any so far tested, it is necessary to take into consideration the following well recognized variables which enter the complex problem of active immunization: namely, the multiplicity of types found in the human host; the short duration of serum antibodies following either the disease or active immunization; the incidence of the disease; and variation in response to a pneumococcus vaccine. Natural immunity is omitted from this list of variables inasmuch as no satisfactory method has been devised to measure such an attribute in the human host.

The problem of the multiplicity of types which cause this disease involves the preparation of a satisfactory polyvalent antigen. The whole-cell vaccine

* Read before the Health Officers Section of the American Public Health Association at the Sixty-eighth Annual Meeting in Pittsburgh, Pa., October 18, 1939. This is one of a series of studies carried out in part under a grant from the Influenza Commission of the Metropolitan Life Insurance Company.

is highly type-specific; and to attempt to make a vaccine of the entire 36 types of pneumococci would be a laborious and unquestionably an impractical procedure. For this reason, endeavors have been made to discover if possible the "common denominator" of this large number of specific types. The results so far have been simply suggestive of such a possibility. It has been found that polysaccharide prepared by the calcium phosphate method [5] from Type I organisms stimulates antibody response in human beings against Type II almost as well as against the specific organism. This is true despite the facts that the immunity obtained in mice is type-specific, and that the antigen does not contain the species-specific C substance of Tillett and Francis.[6] Whether or not it will be possible to isolate or prepare an antigen which will produce an active immunity against all types is a mere speculation which awaits further investigations.

It has long been recognized that serum antibodies following pneumonia persist for a relatively short time, 3 months to 1 year. The antibodies stimulated by the polysaccharide antigen persist for varying lengths of time in different individuals from 6 months to 2 years, the longest period tested. It is pertinent, however, to recall Cole's investigation in 1904 [7] in which he found that after an animal had been immunized once to typhoid, a second immunization occurred more readily than the first. An excellent example of such a phenomenon in humans is found in the work of Siler and Dunham [8] in which it was shown that, after the regular course of typhoid vaccination in 100 individuals, a single dose smaller than any of the 3 doses given previously resulted in stimulation of serum antibodies of as high titer as produced by the 3 original doses. It would thus appear that the tolerance once established in the host has stimulated the biological processes necessary for development of such tolerance and that this increased activity is a more or less permanent characteristic. Hence it is conceivable that once immunized against pneumococcus infection, a high potential resistance may persist for a much longer time than is indicated by the presence of serum antibodies.

The incidence of pneumonia is high compared to many other infectious diseases, and in the general population of the United States, annually the average is approximately 1 in every 500 individuals. This rate includes all age groups, and is highest under 1 year and past middle age. Thus it would be necessary to immunize 500 to protect one individual against the disease until methods are devised to measure susceptibility. If it is found that active immunity remains only as long as serum antibody persists, it would be necessary to immunize the general population once every 1 or 2 years—truly an expensive program and a heavy personal tax. The logical procedure perhaps would be to discover why only the one individual succumbs, in view of developing means of prevention in those found to be susceptible. Certainly it has been established by many investigators that a high percentage of individuals, especially in the winter season, harbor pneumococci at least for a short time. The query is therefore: why with this high carrier rate is the incidence only one in 500?

One possible explanation of the incidence of pneumonia is the thesis of this paper. Early in our work on the use of an antigenic polysaccharide,[9] as well as whole-cell vaccine, great individual variation of response was noted as measured by the serum antibody content following injection. Gradually over a period of years data have been accumulated on slightly over a thousand individuals who have been immunized with an antigenic pneumococcus poly-

TABLE 1

Individual Variation in Antibody Response

Type I

		Lethal Doses *														
		Number Before Immunization							Number After Immunization							
Ages	*Total*	*0*	*1*	*10*	*100*	*1,000*	*10,000*	*100,000*	*0*	*1*	*10*	*100*	*1,000*	*10,000*	*100,000*
2–9	5	5	0	0	0	0	0	0	0	0	0	0	5	0	0
10–19	166	114	21	13	10	4	4	0	4	4	5	17	41	51	44
20–29	314	213	53	18	18	5	6	1	10	4	17	28	84	89	82
30–39	232	169	35	7	7	8	3	3	13	9	18	30	62	57	43
40–49	152	97	30	8	9	5	3	0	10	4	14	17	36	39	32
50–59	129	79	28	9	7	3	2	1	13	2	10	11	30	30	33
60–69	80	50	21	3	4	2	0	0	7	4	8	10	13	15	23
70–79	21	18	2	0	0	1	0	0	3	2	2	2	2	7	3
Totals	1,099	745	190	58	55	28	18	5	60	29	74	115	273	288	260

* Lethal doses against which 0.1 cc. serum protects mice

saccharide. The dose used in this group was not constant, but inasmuch as comparisons with the same dose of antibody were made in relatively large subgroups, and the variation in antibody content occurred to the same degree when an antigenic dose was given, it seemed valid to include them all in this general summary. The procedure published elsewhere,[10] using a mouse protection test to estimate serum antibody, was employed throughout this experiment. In the data given in the following tables, these points are to be emphasized: (1) the number of individuals who had antibody in the blood prior to immunization; (2) the general response in different age decades; (3) the great variability in antibody titer irrespective of age; and (4) the number of individuals who failed to respond to the antigen.

First, it may be noted in Tables 1 and 2 that out of the 1,099 persons tested against Type I prior to immunization, the average of those having some antibody is 354, or 32.2 per cent, and against Type II (Tables 3 and 4) 357 out of 1,098, or 32.6 per cent. The titer of the serum is for the most part low in comparison with the serum following immunization. In contrast the same group after immunization give demonstrable serum antibodies with Type I in 94.5 per cent and with Type II in 98.9 per cent. These figures of course

TABLE 2

Individual Variation in Antibody Response

Type I

		Lethal Doses *														
		Per cent Before Immunization							Per cent After Immunization							
Ages	*Total*	*0*	*1*	*10*	*100*	*1,000*	*10,000*	*100,000*	*0*	*1*	*10*	*100*	*1,000*	*10,000*	*100,000*
2–9	5	100.0	0	0	0	0	0	0	0	0	0	0	100.0	0	0
10–19	166	68.6	12.6	7.8	6.0	2.4	2.4	0	2.4	2.4	3.0	10.2	24.6	30.7	26.4
20–29	314	67.8	16.8	5.7	5.7	1.5	1.9	0.3	3.1	1.3	5.4	8.9	26.7	28.3	26.0
30–39	232	72.9	15.0	3.0	3.0	3.4	1.2	1.2	5.6	3.8	7.7	12.9	26.7	24.6	18.5
40–49	152	63.8	19.7	5.2	5.9	3.2	1.9	0	6.5	2.6	9.2	11.1	23.6	25.6	21.0
50–59	129	61.2	21.7	6.9	5.4	2.3	1.5	0.7	10.0	1.6	7.7	8.5	23.2	23.2	25.5
60–69	80	62.5	26.2	3.7	5.0	2.5	0	0	8.7	5.0	10.0	12.5	16.2	18.7	28.7
70–79	21	85.7	9.5	0	0	4.7	0	0	14.2	9.5	9.5	9.5	9.5	33.3	14.2
Totals	1,099	67.8	17.2	5.3	5.0	2.5	1.6	0.5	5.5	2.6	6.7	10.4	24.8	26.2	23.6

* Lethal doses against which 0.1 cc. serum protects mice

include those of sera protecting against only 1 or 10 lethal doses. Such increase in antibody following immunization has some influence on the incidence of the disease. For in our study over a period of 4 years in coöperation with the U. S. Army and with officials of the CCC camps,[11] in which 60,000 volunteers were immunized with 72,000 controls, there was a reduction of incidence of 50 per cent and the mortality of those in the immunized group who contracted the disease was lower than in the controls.

It is well known from clinical observations by many physicians that the incidence of pneumonia is very high from birth to 1½ years, it decreases to about 15 years, and then increases rather rapidly in succeeding decades. Whether or not this is due to a worn-out antibody mechanism, or to some yet unknown factor awaits demonstration. In Charts 1 and 2 are plotted the percentages of individuals from 10 to 79 years whose sera showed antibody prior to immunization and those who developed antibody following immunization. It may be observed that in both types, there was no great reduction in the percentage of individuals who had antibody prior to immunization in the different ages up to 60–69, but there was a somewhat lower rate in the 70–79 group. However, insufficient numbers were studied in this latter group (Type I 21, Type II 20) to make these observations comparable to those in the earlier decades. It is of interest to add that serum antibodies are rarely found in infants and the percentage increases with age apparently in proportion to the number of human contacts. In contrast, after immunization, with Type I there was a gradual decrease in the response with advancing years, but with Type II all those in the decades 10–19, 60–69 and 70–79 responded, the few non-reactors being found in the decades 20–59. However, as seen in Table 3, there was significant variation in the degree of response in these latter decades similar to Type I. Thus in the case of Type I, there is some evidence to indicate the possibility that increased incidence may be due at least in part to a worn-out immunological mechanism. This apparently is not the case with Type II. However, there is no significant difference between Types I and II in the variation in response with advancing years. This variation may well be as important a consideration to indicate the possible susceptibility of the individual as the relative numbers who failed to respond.

The high carrier rate of pneumococci in comparison to the relatively low incidence indicates definitely the existence of variation in individual resistance to pneumococcus infection. In our opinion, this is true even taking into consideration any one of the many theories as to the mechanism of the infection which results in the production of lobar pneumonia. Experimentally it has been shown by many investigators that resistance to different organisms as well as toxins varies in different animal species and in different members of one species. Whether or not the presence of serum antibody in humans indicates resistance to pneumonia, the response to the antigen used demonstrates clearly a variation in ability to manufacture this antibody. In Table 2, it is seen that of this group, irrespective of age, 2.6 per cent had sufficient antibody to protect against one lethal dose of Type I, 6.7 per cent against 10, 10.4 per cent against 100, 24.8 per cent against 1,000, 26.2 per cent against 10,000, 23.6 per cent against 100,000 lethal doses. Although a higher number of individuals responded well, the same general curve is found with respect to Type II (Table 4). A great many of the sera which protected against 100,000 lethal doses were titrated further and some protected against 1,000,000 and

TABLE 3

Individual Variation in Antibody Response

Type II

		Lethal Doses *													
		Number Before Immunization							Number After Immunization						
Ages	Total	0	1	10	100	1,000	10,000	100,000	0	1	10	100	1,000	10,000	100,000
2–9	3	3	0	0	0	0	0	0	0	0	2	0	1	0	0
10–19	155	110	25	6	6	4	2	2	0	0	2	7	31	44	70
20–29	318	200	56	13	30	13	6	0	2	3	7	18	80	85	123
30–39	237	160	32	10	22	4	5	4	5	0	12	17	46	64	93
40–49	156	100	25	6	15	4	6	0	2	2	4	12	25	46	65
50–59	132	98	17	3	7	1	4	2	3	0	5	6	22	37	59
60–69	77	54	8	2	8	2	3	0	0	1	2	6	12	29	27
70–79	20	16	1	1	0	2	0	0	0	0	2	2	4	9	3
Totals	1,098	741	164	41	88	30	26	8	12	6	36	68	221	314	440

* Lethal doses against which 0.1 cc. serum protects mice

a few against as high as 10,000,000 lethal doses. Inasmuch as the entire group was not so tested, these observations are omitted from the present tables; the higher titers are included in the 100,000 column. The degree of antibody response is unexpectedly high. Yet from our original experiments, as well as experiments now under way, on comparison of the whole-cell vaccine with polysaccharide antigen, variations are not due to the polysaccharide antigen, for this same wide difference in response in various individuals is found with whole-cell vaccine. Although the results so far indicate a reduction of incidence by active immunization, it is pertinent to realize that this reduction is only 50 per cent, and hence a significant number of cases occur in the injected group. It is possible therefore that the cases occur in individuals whose response to the antigen is of low degree.

Certain individuals were unable to manufacture antibody following injection of this polysaccharide antigen. The numbers are given in Tables 1 and 3. It is seen that out of 1,099, 60 individuals, or 5.5 per cent, failed to respond to Type I, and with Type II out of 1,098, 12, or 1.1 per cent, failed. In other words, 1 in 20 individuals failed with Type I and 1 in 100 with Type II. In view of the high carrier rate, the number of negative reactors

TABLE 4

Individual Variation in Antibody Response

Type II

		Lethal Doses *													
		Per cent Before Immunization							Per cent After Immunization						
Ages	Total	0	1	10	100	1,000	10,000	100,000	0	1	10	100	1,000	10,000	100,000
2–9	3	100.0	0	0	0	0	0	0	0	0	66.7	0	33.3	0	0
10–19	155	70.9	16.1	3.9	3.9	2.6	1.3	1.3	0	0	1.3	4.5	20.1	28.5	45.4
20–29	318	62.8	17.6	4.0	9.4	4.0	1.9	0	0.6	0.9	2.2	5.6	25.1	26.7	38.6
30–39	237	67.5	13.5	4.2	9.2	1.7	2.1	1.7	2.1	0	5.0	7.1	19.4	27.0	39.2
40–49	156	64.1	16.0	3.8	9.6	2.6	3.8	0	1.3	1.3	2.6	7.6	16.0	29.4	41.6
50–59	132	74.2	12.9	2.3	5.3	0.7	3.0	1.5	2.3	0	3.8	4.5	16.6	28.0	44.6
60–69	77	70.1	10.4	2.6	10.4	2.6	3.9	0	0	1.3	2.6	7.8	15.5	37.6	35.9
70–79	20	80.0	5.0	5.0	0	10.0	0	0	0	0	10.0	10.0	20.0	45.0	15.0
Totals	1,098	67.4	14.9	3.7	8.0	2.7	2.3	0.7	1.1	0.5	3.3	6.2	20.1	28.6	40.0

* Lethal doses against which 0.1 cc. serum protects mice

CHART 1—ACTIVE IMMUNIZATION—TYPE I PNEUMOCOCCUS
1,099 Individuals, Ages 10–80 Years—Per cent with Serum Antibodies

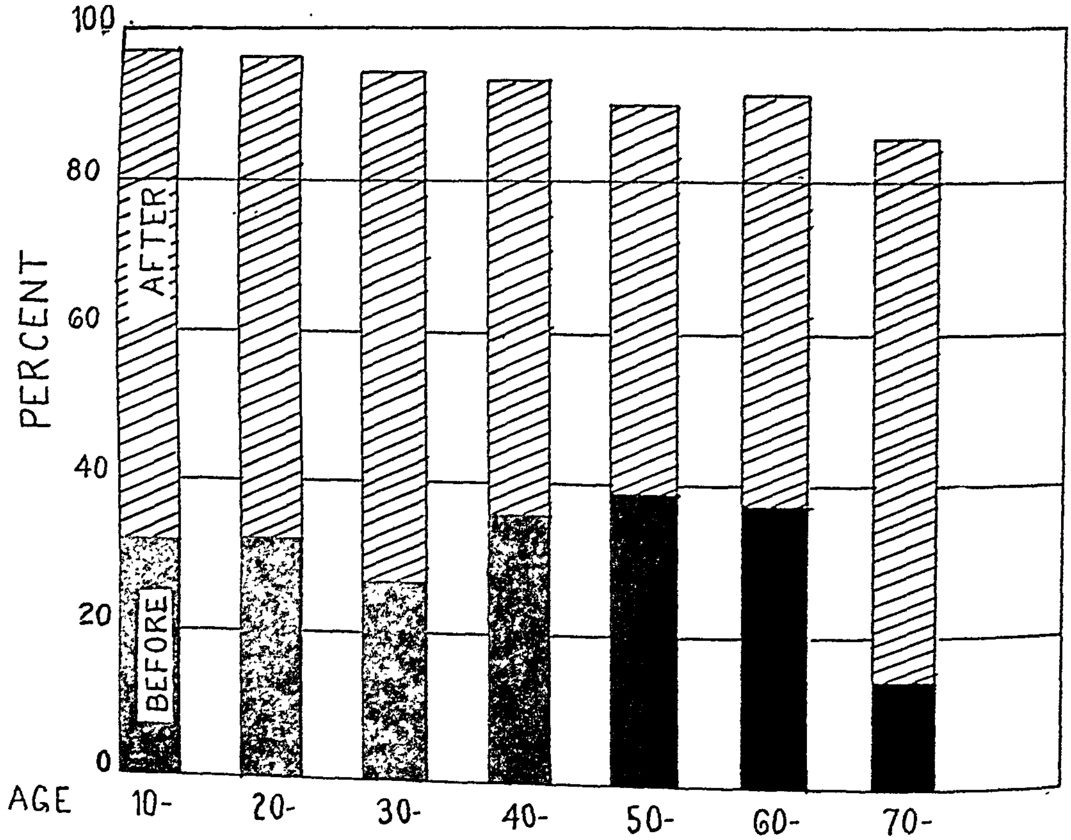
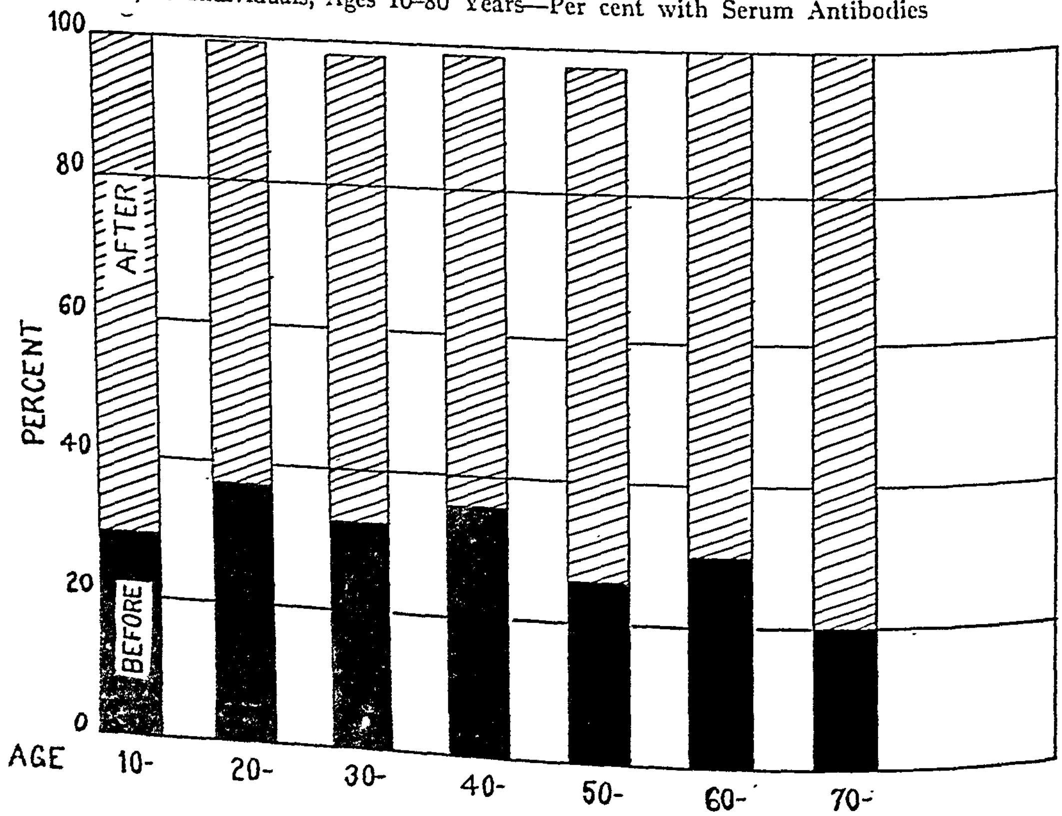


CHART 2—ACTIVE IMMUNIZATION—TYPE II PNEMECOCCUS
1,098 Individuals, Ages 10–80 Years—Per cent with Serum Antibodies



may be sufficient to account for the incidence of the disease. Again if to the negative reactors are added those who responded only to the degree that 0.1 cc. serum protected against 1 and 10 lethal doses, there are 14.8 per cent with Type I, and 4.9 per cent with Type II who might be considered poor reactors. Thus it is conceivable that this variation in response to the present antigen provides a means for estimating the degree of individual resistance to pneumonia and thus makes it possible to separate the resistant from the susceptible individuals.

Accordingly, from the fact that the use of this polysaccharide antigen results in only 50 per cent reduction in incidence, and that there is a very great variation in individual response to this antigen, it seems worth while to attempt to separate a sufficiently large sample of the population into the good and the poor reactors to determine whether such a separation divides the non-susceptibles from the susceptibles. The mouse protection test is obviously impractical as a means of making such division. The skin test of Francis and Tillett,[12] reported to indicate serum antibody, suggested itself as of possible value for this purpose. A preliminary trial, in collaboration with Prather,[13] has shown that the skin test prior to immunization has a low degree of correlation with serum antibodies as estimated by the mouse technic; however, after immunization, the correlation is somewhat over 80 per cent. Whether or not a higher correlation can be obtained by improvement in the antigen is a problem now being investigated. At any rate, the test makes a rather arbitrary selection, and preliminary work on small groups is being done now to see whether or not the incident rate is low or nil with those who give a skin-positive test, and high in the negative group. The need of a relatively large sample of the population to obtain significant results is obvious; and until such an opportunity is afforded, the final answer to the present hypothesis cannot be made. However, if it is found that susceptibility can be measured by the ability of the host to produce antibody, and if this is found to be a constant characteristic of the host, then the positive skin test or positive serum antibody following an immunizing dose would indicate that the high resistance to pneumococcus is a permanent attribute. Consequently efforts to increase host resistance could be limited to a relatively small sample of the population, the negative reactors, and thus a feasible program of prophylaxis against pneumonia and pneumococcus infections could be planned.

The questions asked the author repeatedly as to practical methods for prevention of pneumonia, or whether the time is ripe to attempt general immunization, are answered in the above discussion. It is suggested that those who are interested may help evaluate the polysaccharide antigen by following the positive and negative reactors over a period of years to determine the incidence of pneumonia in these two groups. The state or county health units would be able to carry out such a program with a minimum of expense. Certain areas might be chosen with a relatively stable population so that a satisfactory follow-up system could be arranged. Certainly an initial period of 3 years should be allotted to such an experiment.

Although there are other factors to be considered in development of a better understanding of the epidemiology of this disease, our interpretation of the data here presented supports the assumption that one important factor is the variability of the human host to respond to an active immunizing antigen. The chance for spreading of infection from one individual to another is great as indicated by the high carrier

rate. Consequently the host factors must influence the actual infection with the final outcome—lobar pneumonia. If the carrier responds well to the type of organism harbored, antibody will be produced and the resistance increased markedly, and the individual may be considered immune. This assumption must take into consideration the antigenicity for humans of any one type or all types of the pneumococcus. On the other hand, in the individual who cannot respond to such an antigen, the likelihood of invasion would be increased and a state of hypersusceptibility might be thought to exist. This hypothesis can only be verified as it is found that the degree of response to an active antigen is a permanent characteristic of any one individual, that is, if negative reactors remain negative and positive remain positive. This in turn may be proved if, under conditions of a well conducted experiment in a sufficiently large sample of the general population, the incidence of pneumonia in the poor reactors is high, and in the good reactors is low.

SUMMARY AND CONCLUSIONS

In a study of 1,099 individuals before and after immunization with an antigenic pneumococcus polysaccharide, polyvalent Types I and II, the following conclusions may be made: (a) the percentage of individuals with antibody prior to immunization is with Type I 32.2 per cent and with Type II 32.6 per cent; (b) after immunization, the percentage showing serum antibodies is respectively for Type I 94.5 per cent and for Type II 98.9 per cent; (c) this response shows no significant variation in the different age groups; (d) irrespective of the age groups tested, the response as indicated by serum antibody titer varies from protection by 0.1 cc. serum against 100,000 lethal doses to that against as little as 1 lethal dose; (e) certain individuals fail to produce antibody—with Type I out of 1,099 there were 60, or 5.5 per cent, and with Type II, 12, or 1.1 per cent. It is suggested that this individual variation to pneumococcus polysaccharide antigen is an important factor in the relative resistance to pneumococcus infection.

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Basic Principles of Industrial Sanitation*

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A CRYSTALLIZATION of our concepts of industrial hygiene has been taking place during the past few years. Objectives have always been clearly fixed, but the magnitude of the problems that have faced students in this field has delayed a rationalization of its proper place in a public health program. Now, with a long record of achievements, industrial hygiene has acquired a status and may be regarded as a science with distinctive attributes.

It is not so long ago that industrial hygiene embraced merely the knowledge that occupational diseases and environment were intimately related. This in itself was significant, yet so long as the quantitative aspects of the relationship were undefined, it is doubtful that the great strides made in the past few years could have been possible. Until measurable bench marks could be developed there was no opportunity for industry to gage the worker's environment in so far as it affected health, and certainly no chance for government to enforce rules and regulations. It is to the credit of recent investigators, both physicians and engineers, that the quantitative aspects of industrial hygiene have been developed and placed upon a firm foundation. Industrial hygiene has given us new tools for research and a still newer and more wholesome approach to studies in many related fields; notably it has created the science of "air sanitation." Problems still remain with us as great as those already solved, but unlike earlier investigators who had to develop tools as well as technics, we have a better comprehension of the rôle played by the industrial environment on the health of workers, and thus are able to apply them more effectively. As will be evident in the paragraphs which follow, industrial hygiene consists chiefly in applying certain parts of more fundamental sciences to the control of the industrial environment.

For the purposes of discussion, we may consider industrial hygiene as organized along the lines shown in Figure 1. This diagram is not intended to make any distinction in the fields of engineering and medicine. The two must be regarded as complementary. Much of the success achieved by industrial hygiene units in this country has been due to the close relationships which have existed between these two professions. It is this association that has given force and direction to industrial hygiene as a science.

* Read at a Joint Session of the Engineering and Industrial Hygiene Sections of the American Public Health Association at the Sixty-eighth Annual Meeting in Pittsburgh, Pa., October 18, 1939.

† Deceased June 13, 1939.

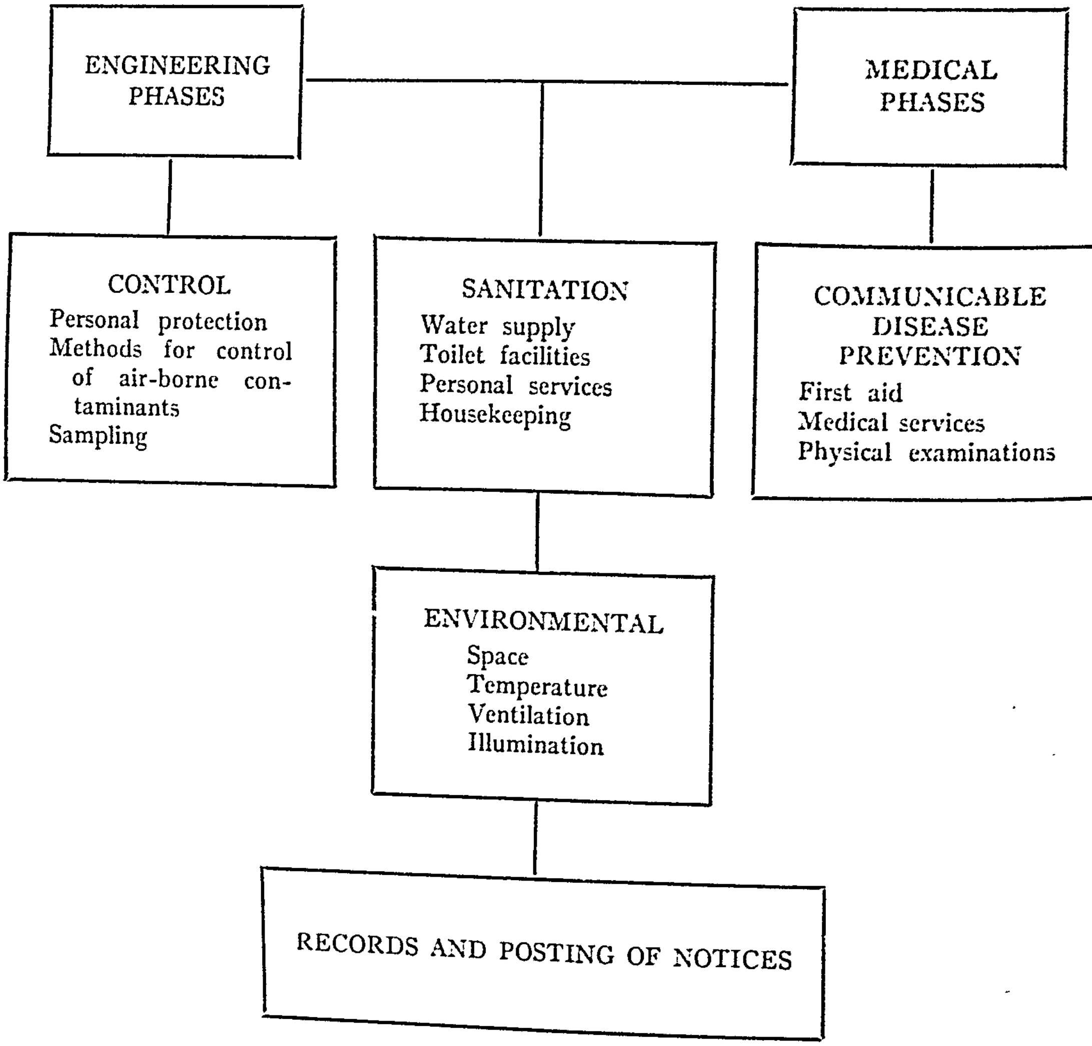

FIGURE 1—*Relationship of engineering and medical phases of industrial hygiene*

SANITATION PRINCIPLES ‡

The principles of sanitation applied to the industrial environment do not differ from those forming a part of community sanitation. Their primary purpose is to control the causative factors of disease. However, in accordance with the accepted definition of sanitation, the principles are interpreted as applying to the prevention of diseases other than occupational. Thus, they are concerned with the provision of safe drinking water, sanitary toilets, rat-proofing, screening (in southern regions), good housekeeping, clean lunch rooms, and the collection and disposal of wastes which are associated with the diarrheal diseases, plague, malaria, tetanus, lockjaw, and tuberculosis, to mention a few.

‡ These principles and those which follow are adopted from the text of a bulletin entitled "Basic Principles of Industrial Hygiene and Sanitation," by R. R. Sayers, J. M. DallaValle, and R. R. Jones, National Institute of Health, U. S. Public Health Service, unpublished.

WATER SUPPLY

1. There should be provided, in all places of employment, an approved supply of clean, cool, wholesome, and safe drinking water.

2. All water furnished for drinking purposes should be from a source approved by the local health authorities having jurisdiction. When such is not available, the state authorities should furnish directions for rendering the water safe for human consumption.

3. The temperature of the water supplied for drinking purposes should not be lower than 40° F., nor greater than 80° F., and preferably between 45° F. and 50° F.*

4. Where sanitary drinking fountains are provided, they should be of an approved type and construction.† At least one drinking fountain should be provided for every 50 persons employed.

5. In all instances where water is cooled by ice, the construction of the container should be such that the ice does not come in direct contact with the water.

6. The common drinking cup should be prohibited.

7. When individual drinking cups (to be used but once) are supplied, a suitable container should be provided for the unused cups, as well as a receptacle for disposal of the used cups.

8. Open containers such as barrels, pails, or tanks for drinking water for general use, from which the water must be dipped or poured, whether fitted with a cover or not, should not be allowed.

9. Where water is taken from an unapproved source and is used for industrial processes or fire protection, notices should be posted stating clearly that such water is unsafe and not to be used for drinking, and every reasonable effort should be made to prevent it being so used. There should be no pipe connection, open or potential, between a system furnishing water for drinking purposes and a system furnishing water for other uses.

TOILET FACILITIES

1. Every place of employment should be provided with adequate water closets, chemical closets, or privies, separate for each sex. Wherever privies are permitted, they should be constructed in accordance with the *Specification for the Sanitary Privy (Supp. 108, Pub. Health Rep.).*

2. Covered receptacles should be kept in all toilet rooms used by females.

3. In each toilet room an adequate supply of toilet paper, in proper holder, should be provided, and it should be of material which will not obstruct fixtures or plumbing.

4. Unless the general washing facilities are on the same floor and in close proximity to the toilet rooms, adequate washing facilities should be provided in every toilet room or any room adjacent thereto.

5. Toilet rooms should be readily accessible to employees using them. No toilets should be more than one floor above or below the regular place of work of the persons using them. This rule need not apply when passenger elevators are available for employees' use in going to and from toilet rooms.

6. Toilet facilities (closets) should be provided for each sex according to Table 1. The number to be provided for each sex should in every case be based on the maximum number of persons of that sex employed at any one time on the premises for which the facilities are furnished. When persons other than employees are permitted the use of toilet facilities (closets) on the premises, a reasonable allowance should be made for such other persons in estimating the minimum number of toilet facilities (closets) required.

TABLE 1

Toilet Facilities Recommended

Number of Persons	*Minimum Number of Facilities*
1 to 9	1
10 to 24	2
25 to 49	3
50 to 100	5
Over 100	1 for each additional 30 persons

7. Whenever urinals are provided, one facility less than the number specified in Table 1 may be provided for males for each urinal, except that the number of facilities in such cases may not be reduced to less than two-thirds of the number specified in the table. Two feet of acid-resisting porcelain enamel urinal may be considered as equivalent to one urinal.

8. Every new urinal installed should be made of material that is impervious to moisture. Cast, galvanized iron, sheet metal, or steel urinals should be prohibited unless coated with vitreous enamel. Where slate is used, it should be of the best quality.

9. The floor to a distance of not less than 24" in front of all urinals should be constructed of waterproof material, and whenever new wall or vertical slab urinals are installed, the floor in front of the urinals should slope toward the urinal trough.

10. Every urinal should be flushed from a separate water supply system or through flush valves. Every such system hereafter installed should use not less than 1 gallon for each discharge for every fixture or stall. In place of such discharge from a flush system or valve, water may be allowed to run continuously over slab urinals.

11. The walls of compartments or partitions between fixtures may be less than the

* Usual practice.
† See reference 9.

height of the room walls, but the top should be not less than 6′ from the floor, and bottom not more than 1′ from the floor.

12. The door to every toilet room should be fitted with an effective self-closing device and screened so as not to be visible from the workroom. All "compartment" doors should be supplied with latches.

13. In all new toilet rooms installed, the floors and side walls to a height of 6″ including the angle formed by the floor and the side walls should be watertight and impervious to moisture.

14. The floors, walls, and ceilings of all toilet rooms should be of a finish that can easily be cleaned.

15. The walls of every toilet room should be of solid construction and should extend to the ceiling, or the area should be independently ceiled over. Above the level of 6′ the wall may be provided with glass that is translucent but not transparent.

16. In new installations the minimum floor space allotted for toilet facilities (closets), lavatories (wash basins), and urinals should be as shown in Table 2.

TABLE 2

Space Allotment for Toilet Facilities

	Minimum Width In.	*Minimum Depth Ft.*	*Minimum Total Floor Space Sq. Ft.*
Facilities	32	3.6	16
Lavatories	24	3.6	12
Urinals	24	3.6	12

17. The construction and maintenance of toilet fixtures should comply with the state or local building and plumbing codes, where such codes exist. In other cases, it is suggested that the requirements of *Bulletin of Building and Housing 13* of the Bureau of Standards, U. S. Department of Commerce, be followed.

18. Every water closet bowl should be set entirely free and open from all enclosing woodwork, and should be so installed that the space around the fixture may be cleaned easily.

19. Every water closet, except those of the integral seat type, should have an open-front seat made of substantial material. If absorbent material is used, the seat should be finished with varnish or other substance to make it impervious to moisture, and should preferably be light in color.

20. Chemical closets and privies should not be permitted except where no sewer is accessible, and no privy should be permitted where it is impossible to construct and maintain the same without danger of contaminating any source of drinking water.

21. When chemical closets are used they should be of a type approved by the health authorities having jurisdiction, and should be maintained in a sanitary condition.

22. The container should be changed frequently enough that it will not be allowed to become more than two-thirds full; the contents at all times to be disposed of in accordance with the regulations of the health authorities having jurisdiction.

23. In every establishment employing more than 25 persons, the use of privies should be prohibited. In such instances where permitted, they should be constructed and maintained in accordance with *Specifications for the Sanitary Privy (Supplement 108 of the Public Health Reports).*

24. No privy should be located within 100′ of any room where foodstuffs are stored or handled.

25. All toilet rooms having windows should be equipped with screens.

WASHING FACILITIES

1. Adequate facilities for maintaining personal cleanliness should be provided in every place of employment. The same should be convenient for the employees for whom they are provided, and should be maintained in a sanitary condition.

2. At least one lavatory (wash basin) with adequate water supply should be provided for every 10 employees or portion thereof, up to 100 persons; and one lavatory (wash basin) for each additional 15 persons or portion thereof. Twenty-four inches of sink with individual faucet may be considered equal to one basin. Soap in a suitable dispensing container should be provided at each wash place.

3. Separate wash rooms should be provided for each sex. Where such rooms adjoin, the enclosing walls should be of solid construction.

4. Every new wash basin installed should be made of vitreous, glazed, artificial, enameled iron, or other glazed material impervious to water. Galvanized cast iron may be permitted for sinks.

5. Unless the general washing facilities are on the same floor and in close proximity to the toilet room, at least one wash basin should be provided in each toilet room or room adjacent thereto.

6. All floors under sinks and basins should be kept sanitary and in good repair.

7. The common towel is prohibited.

8. Individual towels of cloth or paper should be provided and proper receptacles

maintained for disposing of used towels. Other apparatus for drying the hands may be substituted for towels only after approval by the enforcing authority.

9. A lavatory (wash basin), supplied with hot and cold water from 1 faucet, should be provided for every 5 employees exposed to skin contamination with poisonous, infectious, or irritating material.

10. One shower bath with an ample supply of hot and cold water from one fixture should be provided for every 15 workers or less exposed to skin contamination with poisonous, infectious, or irritating material.

11. No strong alkali or harsh abrasive soaps should be permitted.

12. Oils or solvents used for removing dyes, or other contaminants from the skin, which are not ordinarily removed by soap and water, should be used sparingly. Workers should not be permitted to dip their hands in any cleaning oil or solvent, but should place a small amount on clean wiping cloths provided by the employer.

13. Water from any source not approved by the state or local authorities should not be used for wash purposes.

PERSONAL SERVICES

1. In workshops, factories, or other places of employment where it is necessary for male employees to change their clothing or where females are employed, adequate separate dressing rooms with lockers for males and females should be provided.

2. All personal service rooms should be, so far as possible, screened and otherwise protected so as to prevent the entrance or harboring of rats, insects, or vermin of any kind in such quarters, and they should be maintained in a sanitary condition.

3. Dressing rooms should be provided for men whenever the type of work performed involves exposure to excessive dust, dirt, heat, fumes, vapor, or moisture of such degree as is declared by the enforcing authority to require the same.

4. Two-compartment lockers should be provided in a separate room from the place of work for employees whose clothes are exposed to contamination with poisonous, infectious, or irritating material, and well separated facilities should be provided for street and working clothes.

5. Where the process in which the worker is engaged is such that his working clothes may become wet or have to be washed between shifts, they should be so cared for that dry clothes are assured for the return to work.

6. Adequate provision for drying outdoor clothing, if wet, should be made.

7. Where less than 10 women are employed and a retiring room is not furnished, some equivalent space should be provided which can be screened properly and made suitable for the use of women employees.

8. The minimum space provided for a retiring room for 10 women should be 60 sq. ft. The minimum increased space for more should be at least 2 sq. ft. for each additional woman employed.

9. At least one couch or bed should be provided in every place where more than 10 women are employed. The number of such beds or couches required should be as follows: 10 to 100 women, 1 bed; 100 to 250 women, 2 beds; and 1 additional bed for each additional 250 women employed.

10. The walls and partitions of every retiring room should be of solid construction and should be at least 7′ high. Glass of approved translucence may be inserted in such walls or partitions. Every retiring room should be so constructed and maintained that privacy may be secured at all times and should be provided with locker or separate clothes hook for every female employee, unless such facilities are elsewhere provided.

11. In every establishment a separate lunch room should be maintained unless it is convenient for the employees to lunch away from the premises. Table 3 gives the number of square feet per person, based on the maximum number of persons using the room at one time, which should be required.

TABLE 3

Lunch Room Areas Recommended

Persons	*Square Feet per Person*
Less than 25	8
25– 74	7
75–149	6
150–499	5
500 and more	4

12. All factories, workshops, and other places of employment should allow all employees at least ½ hour for their midday meal, after being continuously employed for a period of not more than 5 hours on any work day, except Saturday.

13. Notice of the hours within which employees may partake of such meals should be plainly printed and kept posted at a conspicuous place in all workrooms where employees are engaged.

14. No employees should be allowed to eat lunch at their place of work, or in the workroom.

15. All water closet compartments, all toilet rooms, all wash, dressing, and retiring rooms, all privies, and the floors, walls, ceilings, and surfaces thereof, and all fixtures therein, should at all times be kept and maintained in good repair and in clean, odorless, and sanitary condition. They should also be screened.

16. The enclosure of all toilet rooms, dressing rooms, or water closet compartments, and all fixtures should be kept free from all indecent writing or marking, and such defacement, when found, should at once be removed by the employer.

17. A covered receptacle should be provided for disposing of all waste food, and employees should use the same for the disposal of all such materials.

HOUSEKEEPING

1. All places of employment, passageways, storerooms, and service rooms should be kept in a sanitary condition.

2. The roof, passages, stairs, halls, basements, cellars, privies, water closets, cesspools, drains, and all the premises thereof, should at all times be kept in a clean, safe, and sanitary condition.

3. Every establishment and the premises thereof and the yards, courts, passages, areas, or alleys connected with or belonging to the same should be kept free from any accumulation of dirt, filth, rubbish, or garbage.

4. The floor of every workroom should be maintained in a clean, and, as far as possible, dry condition. Where wet processes are used, reasonable drainage should be maintained and false floors, platforms, mats, or other dry standing places should be provided. The employer should, without expense to the employee, furnish proper boots or shoes for the use of the employee while at work in such places.

5. Floors and other walk-way surfaces should be kept in good repair, free from accumulations of oil and water. All dangerous projections from walk-ways should be eliminated.

6. So far as is practicable, sweeping and cleaning should be done outside of working hours and in such manner as to avoid the dissemination of dust.

7. Every floor, working place, and passageway should be kept free from protruding nails, splinters, holes, and loose boards.

8. Expectorating upon the walls, floors, work places, or stairs of any establishment covered by these recommendations should be prohibited.

9. Cuspidors, if used, should be of such construction that they can be kept clean and disinfected; they should be cleaned daily to prevent them from becoming a menace to health.

10. Whenever a receptacle is used for waste or refuse which is liquid or liable to decompose, it should be so constructed that it does not leak, and may be conveniently and thoroughly cleaned, and it should be maintained in a sanitary condition.

11. All sweepings, waste, refuse, and garbage should be removed as often as necessary to maintain the place of employment in a sanitary condition.

12. Wherever mechanical or chemical equipment is used to maintain sanitation, periodic inspection should be required to assure the efficiency of such equipment and record made of every inspection.

13. Lighting fixtures should be cleaned often enough to keep the intensity of illumination above the prescribed minimum values. Where dependence is placed on daylight, windows should be kept clean enough to fulfil their purpose.

14. Materials should be piled so that they will not easily fall, or be displaced by vibration or jolts.

15. Discarded material of an inflammable nature should be placed in self-closing metal containers which should be emptied at least once daily.

16. Flammable material should not be stored under stairways.

17. Fire extinguishers should be kept in operable condition, and protected from freezing. If of the soda-acid type they should be recharged at least once a year.

18. Industrial wastes should be treated by approved methods before being dumped into streams.

ENVIRONMENTAL PRINCIPLES

Under the environmental principles are included matters pertaining to space allotment, the control of air temperatures (heating and cooling), the provision of adequate ventilation and illumination, and the elimination and disposal of air-borne contaminants. These items bear directly upon the occupational diseases which, together with the medical principles in another section, form the main part of industrial hygiene. The problems coming within the scope of the environmental principles are numerous and often com-

plex. This treatment can, however, follow a pattern that is easily generalized for the purpose of discussion.

SPACE NEEDS

1. The cubic space of workrooms should be such as to afford, without deduction for benches, machines, furniture, and material, at least 400 cu. ft. per worker.

2. The cubic space for offices should be such as to afford, without deduction for benches, furniture, and material, at least 250 cu. ft. per person.

TEMPERATURE CONTROL

1. Except when outside temperatures exceed 75° F., or where air conditioning is used, or where the work is strenuous, or where the nature of the work requires special temperatures and humidities, the air temperature in all work rooms to which these principles apply should be in accordance with the list of desirable temperatures given in Table 4.

TABLE 4

Desirable Dry Bulb Temperatures for Various Humidities

Relative Humidity (Per cent)	*Desirable Temperatures * (Deg. F.)*
30	72–78
40	71–77
50	70–76
60	69–75
70	68–74

* Based on the comfort zone for winter and summer conditions, chapter 3, *Guide,* American Society of Heating and Ventilating Engineers, 14th ed., 1936.

2. The temperature requirements given in Table 4 may be disregarded in industries having extensive radiant energy sources, such as foundries, steel mills, etc.

3. Where cool air douches are used, the temperature of the effluent air should not be less than 72° F. All cool air douches should be capable of regulation by adjustable dampers and sufficiently flexible to permit the air flow to be directed effectively toward any point at which work is done, unless such douches are distributed so as to be effective over the whole area in which the work is done.

4. In permanent places of employment where it is not possible to maintain temperatures below 95° F., consideration should be given to the advisability of limiting the hours of work and allowing frequent rest periods in a normal environment.

5. Salt tablets should be made available in all environments conducive to the development of heat exhaustion or heat cramps, at no expense to the employee.

VENTILATION REQUIREMENTS

Good and sufficient ventilation, and healthful temperature and humidity conditions should be provided and maintained in every manufacturing establishment, factory, or workshop, for every workroom thereof, and for all allied service rooms in connection therewith (such as office, stock, sorting, shipping, wash, dressing, locker, and toilet rooms), at all times during working hours. No mechanical ventilation system is needed at any place of employment that is constructed with partly open walls or in buildings used for refrigeration.

1. *Natural ventilation*—Windows and other glazed openings should be so constructed as to permit a minimum operable area in accordance with the requirements in Table 5.

TABLE 5

Minimum Operable Window Requirements for Natural Ventilation

Space	*Per cent of Floor Area Served*
Workrooms	8
Offices	8
Eating places and kitchens	8
General store rooms	2
Locker rooms	5
Toilet rooms	5

Every skylight should be so constructed and maintained as to be opened at least one-half of its required area.

2. *Mechanical ventilation*—Where mechanical ventilation is used the system should be designed and constructed, in accordance with generally accepted good practice, to provide the necessary changes of air, but in no case less than suggested by this section.

a. The air supplied by a mechanical system of ventilation should be from an uncontaminated source, free of any injurious substances.

b. If the air supply to any building is contaminated with substances in concentrations exceeding the allowable safe limits, filters, absorbers, air washers, or other approved appliances should be provided to eliminate these impurities.

c. The distribution of the fresh air supplied should be so arranged as to maintain the temperature requirements without un-

comfortable drafts or any direct draft lower than 65° F. in occupied spaces.

d. Any heat source which does not contaminate the air, and which does not conflict with requirements of fire, building, or electrical codes, may be used to warm the air supplied for ventilation, or to provide heat by direct radiation, or both.

e. Offices with less than 25 sq. ft. of floor space per occupant should be provided with at least 15 cu. ft. of air per min. per person. Where the space allotment is in excess of 25 sq. ft., 12 cu. ft. per min. per person should be provided.

f. Workrooms in which the work performed is sedentary, and in which the space allotment is less than 25 sq. ft. of floor area per person, should be provided with at least 20 cu. ft. per min. per person. Space allotment in excess of 25 sq. ft. of floor area should be provided with 15 cu. ft. per min. per person.

g. Workrooms in which the work performed is arduous should be provided with at least 30 cu. ft. per min. per person.

h. Exceptions to (f) and (g) may be permitted when the net free space per worker exceeds 1,000 cu. ft. The ventilation requirements in such instances may be reduced 50 per cent.

i. Kitchens handling food for employees should be provided with at least 8 air changes per hr.

j. Lavatories, toilet rooms, bathrooms, and rest rooms should be provided with at least 4 air changes per hr.

k. Garages should be provided with at least 7,500 cu. ft. of air per min., for every car estimated to be in operation at a given time, and in any case not less than 4 air changes per hr. except in rooms where cars are stored for periods in excess of 1 week, or where special local exhaust is provided, then this requirement is reduced to 3 changes per hr.

TABLE 6

Recirculation Requirements for Various Occupied Spaces

Space	*Amount Air Recirculation Permitted (Per cent)*
Kitchens	None
Lavatories, toilet rooms, bathrooms, and rest rooms	None
Laboratories	None
Workrooms	75*
Restaurants and dining halls	50

* Provided the air is free from harmful dusts, fumes, vapors, and gases.

l. Automobile repair shops should be provided with at least 4 air changes per hr., except where the exhaust of each car is connected to an approved exhaust system, when this requirement may be reduced to 3 air changes per hr.

3. *Recirculation* — Where recirculation is practised it should comply with the requirements given in Table 6.

4. *Miscellaneous* — The following requirements should also be adhered to:

a. The disposal of all matter eliminated by exhaust systems should be so managed as not to endanger the health of any person about the premises or elsewhere in the community.

b. Every main pipe of an exhaust system, both suction and discharge, should be provided with clean-out doors so spaced as to allow the pipe to be thoroughly cleaned.

c. Every pipe should be kept open and unobstructed throughout its length, and no fixed screen may be placed in it. The use of a trap at the junction of the hood and branch pipe is recommended, provided it is not allowed to fill up with dust.

d. Every exhaust system should at all times be kept in good repair and clean condition, and operated in conformity with these rules, while the machinery for which it is provided is in use.

e. Whenever an air duct passes through a firewall, it should be arranged so as to comply with the requirements of the *Building Code* recommended by the National Board of Fire Underwriters, 5th ed., 1934.

f. All duct systems handling organic dust or any easily oxidized substance should be carefully grounded to avoid explosion.

g. In all places of employment where injurious amounts of dusts, fumes, gases, or vapors are liberated into the atmosphere, approved exhaust systems should be installed, maintained in good condition, and effectually operated at all times.

h. The fresh air supplied to replace the air removed by exhaust ventilation should be considered as fresh air in the calculation of the requirements in paragraphs 2(f) and 2(g) above, provided that the air supplied is from an approved source. This provision also applies to cool air douches.

i. Sufficient fresh air should be supplied to all workrooms equipped with exhaust systems to replace all air which is removed. Air supply openings should be so spaced as to give a uniform movement of air throughout the workroom, and produce no drafts.

LIGHTING REQUIREMENTS

1. *Natural illumination*—(a) Every window required by these principles should open directly on a street or other approved open space, or on a court or yard.

(b) Windows and other glass openings for illumination should be constructed in accordance with the requirements given in Table 7.

TABLE 7

Minimum Window Area Requirements for Natural Illumination

Space	*Per cent of Floor Area Served*
Workrooms	30
Offices	15
Eating places and kitchens	15
General storage rooms	3
Basements and cellars	3
Locker rooms	10
Toilet rooms	10

Skylights should have glass areas not less than required for the windows they replace. They should be arranged with the sides extended above the roof and there provided with hinged glazed sash and metal sash openers, having a combined area not less than would be required for openable parts in windows in such locations, or the skylight may be arranged with fixed metal louvred sides of required opening, and a pivoted glazed sash should be provided at the ceiling line of the room.

2. *Artificial illumination*—(a) The requirements for artificial lighting of any work place or process should not be less than the minimum specified in Table 8.* For workrooms and processes not specifically mentioned, the illumination should be at least 5 foot candles. The degree of illumination should be increased wherever detailed work is carried on.

b. Lamp reflectors or other accessories, as well as mounting height and spacing, should be such as to secure a reasonably uniform distribution of illumination, avoiding objectionable shadows, sharp contrasts or brightness, and glare.

c. Bare light sources, located within the field of the worker's vision, should not be used.

d. Emergency lighting should be provided in all work space, aisles, stairways, passageways, exits, and on all fire escapes. Emergency lighting systems, including all supply and branch lines, should be entirely independent of the regular lighting system and should be concurrently in operation with the regular lighting.

e. The lighting provided in all stairways, passageways, and exits of factories should be protected from failure by an independent connection extending back to the main service entrance for the building. In case of unusual danger, which may exist on account of the type of building, nature of the work, crowded conditions, or lack of suitable exit space, an independent service should be insured by connection with a separate source of supply without or within the building.

* The requirements given in Table 8 are open to some criticism since there is no general agreement as to what constitutes adequate lighting.

ENGINEERING CONTROL PRINCIPLES

There are several methods available for protecting workers from exposure to dust, gases, fumes, vapors, and mists. Briefly these are: (a) Personal protection devices, including masks, respirators, and protective clothing, (b) isolation or segregation of hazardous sources, (c) the use of local exhaust ventilation, and (d) the application of wet methods (for dusts). In addition may be mentioned the substitution of noninjurious substances, such as, for example, the use of metal shot instead of sand for abrasive cleaning. Combinations of the various methods mentioned may also be considered as being included in this section. Sampling methods have been included because the effectiveness of any system of control is dependent upon the results of representative samples.

PERSONAL PROTECTION

1. Where exhaust methods or other methods are not sufficient to control dust, gas, fume, vapor, or mist hazards, or other places where there is likely to be danger from unknown gases, fumes, or vapors, workers should be provided with respirators or other respiratory protective equipment approved by the U. S. Bureau of Mines.

2. No worker should be permitted to enter a tank or any closed space where there is likely to be any gas or vapor, unless he is provided with protective respiratory equipment approved by the U. S. Bureau of Mines for this purpose. Such workers should also be provided with a safety rope, which is held slightly taut by a second worker outside the danger zone.

TABLE 8

Minimum Operating Foot Candles—Measured on the Work *

Aisles, Stairways, Passageways	5
Assembly:	
Rough	10
Medium	20
Fine	B*
Extra Fine	A*
Automobile Manufacturing:	
Assembly Line	B*
Frame Assembly	15
Body Manufacturing—	
Parts	20
Assembly	20
Finishing and Inspecting	A*
Bakeries	20
Book Binding:	
Folding, Assembling, Pasting, etc.	10
Cutting, Punching and Stitching	20
Embossing	20
Candy Making:	
Box Department	20
Chocolate Department—	
Husking, Winnowing, Fat Extraction, Crushing and Refining, Feeding	10
Bean Cleaning and Sorting, Dipping, Packing, Wrapping	20
Milling	C*
Cream Making—	
Mixing, Cooking and Molding	20
Gum Drops and Jellied Forms	20
Hand Decorating	C*
Hard Candy—	
Mixing, Cooking and Molding	20
Die Cutting and Sorting	C*
Kiss Making and Wrapping	C*
Canning and Preserving	20
Chemical Works:	
Hand Furnaces, Boiling Tanks, Stationary Driers, Stationary and Gravity Crystallizers	5
Mechanical Furnaces, Generators and Stills, Mechanical Driers, Evaporators, Filtration, Mechanical Crystallizers, Bleaching	10
Tanks for Cooking, Extractors, Percolators, Nitrators, Electrolytic Cells	15
Clay Products and Cements:	
Grinding, Filter Presses, Kiln Rooms	5
Molding, Pressing, Cleaning and Trimming	10
Enameling	15
Color and Glazing	20
Cleaning and Pressing Industry:	
Checking and Sorting	20
Dry and Wet Cleaning and Steaming	10
Inspection and Spotting	A*
Pressing	
Machine	20
Hand	C*
Receiving and Shipping	10
Repair and Alteration	C*
Cloth Products:	
Cutting, Inspecting, Sewing—	
Light Goods	20
Dark Goods	A*
Pressing, Cloth Treating (Oil Cloth, etc.)	
Light Goods	10
Dark Goods	20
Dairy Products	20
Elevators — Freight and Passenger	10
Engraving	A
Forge Shops and Welding	10
Garages—Automobile:	
Storage—Live	10
" Dead	2
Repair Department and Washing	C*
Glass Works:	
Mix and Furnace Rooms, Pressing and Lehr, Glass Blowing Machines	10
Grinding, Cutting Glass to Size, Silvering	20
Fine Grinding, Polishing, Beveling, Etching and Decorating	C* D*
Inspection	B* D*
Glove Manufacturing:	
Light Goods—	
Pressing, Knitting, Sorting	10
Cutting, Stitching, Trimming and Inspecting	20
Dark Goods—	
Cutting, Pressing, Knitting, Sorting	20
Stitching, Trimming and Inspection	A*
Hat Manufacturing:	
Dyeing, Stiffening, Braiding, Cleaning and Refining—	
Light	10
Dark	20
Forming, Sizing, Pouncing, Flanging, Finishing and Ironing—	
Light	15
Dark	30
Sewing—	
Light	20
Dark	A*
Ice Making—Engine and Compressor Room	10
Inspection:	
Rough	10
Medium	20
Fine	B*
Extra Fine	A*
Jewelry and Watch Manufacturing	A*
Laundries	20
Leather Manufacturing:†	
Leather Working:†	
Locker Rooms	5
Machine Shops:	
Rough Bench and Machine Work	10
Medium Bench and Machine Work, Ordinary Automatic Machines, Rough Grinding, Medium Buffing and Polishing	20
Fine Bench and Machine Work, Fine Automatic Machines, Medium Grinding, Fine Buffing and Polishing	B*
Extra Fine Bench and Machine Work, Grinding—Fine Work	A*
Meat Packing:	
Slaughtering	10
Cleaning, Cutting, Cooking, Grinding, Canning, Packing	20
Offices:	
Bookkeeping, Typing and Accounting	30
Business Machines — Power Driven (Transcribing and Tabulating)—	
Calculators, Key Punch, Bookkeeping	B*
Conference Room—	
General Meetings	10
Office Activities—See Desk Work	
Corridors and Stairways	5
Desk Work—	
Intermittent Reading and Writing	20
Prolonged Close Work, Computing, Studying, Designing, etc.	C*
Reading Blueprints and Plans	30
Drafting—	
Prolonged Close Work—Art Drafting and Designing in Detail	C*
Rough Drawing and Sketching	30
Filing and Index References	20

* See reference footnote at end of table.

† An I. E. S. research study of lighting in this industry is now in progress.

TABLE 8—(Cont.)

Offices: (Cont.)	
Lobby	10
Mail Sorting	20
Reception Rooms	10
Stenographic Work	
Prolonged Reading Shorthand Notes	C*
Vault	10
Packing and Boxing	10
Paint Mixing	10
Paint Shops:	
Dipping, Simple Spraying, Firing	10
Rubbing, Ordinary Hand Painting and Finishing; Art, Stencil and Special Spraying	20
Fine Hand Painting and Finishing	B*
Extra Fine Hand Painting and Finishing (Automobile Bodies, Piano Cases, etc.)	A*
Paper Box Manufacturing:	
Light	10
Dark	20
Storage	5
Paper Manufacturing:	
Beaters, Grinding, Calendering	10
Finishing, Cutting, Trimming, Paper Making Machines	20
Plating	10
Polishing and Burnishing	15
Power Plants, Engine Room, Boilers:	
Boilers, Coal and Ash Handling, Storage Battery Rooms	5
Auxiliary Equipment, Oil Switches and Transformers	10
Engines, Generators, Blowers, Compressors	15
Switchboards	C
Printing Industries:	
Type Foundries:	
Matrix Making, Dressing Type	A*
Font Assembly — Sorting	B*
Hand Casting	C*
Machine Casting	20
Printing Plants:	
Presses	C*
Imposing Stones	A* D*
Proof Reading	A*
Photography:	
Dry Plate and Film	2000
Wet Plate	3000
Printing on Metal	2000
Printing Industries: (Cont.)	
Electrotyping:	
Molding, Finishing, Leveling Molds, Routing, Trimming	B*
Blocking, Tinning	C*
Electroplating, Washing, Backing	20
Photo Engraving:	
Etching, Staging	20
Blocking	C*
Routing, Finishing, Proofing	B*
Tint Laying	A*
Receiving and Shipping	10
Rubber Manufacturing and Products:†	
Sheet Metal Works:	
Miscellaneous Machines, Ordinary Bench Work	15
Punches, Presses, Shears, Stamps, Welders, Spinning, Medium Bench Work	20 D*
Tin Plate Inspection	B* D*
Shoe Manufacturing (Leather):	
Cutting and Stitching—	
Cutting Tables	10
Marking, Buttonholing, Skiving, Sorting, Vamping, and Counting—	
Light Materials	20
Dark Materials	C*
Stitching—	
Light Materials	C*
Dark Materials	B*
Making and Finishing—	
Stitchers, Nailers, Sole Layers, Welt Beaters and Scarfers, Trimmers, Welters, Lasters, Edge Setters, Sluggers, Randers, Wheelers, Treers, Cleaning, Spraying, Buffing, Polishing, Embossing—	
Light Materials	20
Dark Materials	C*
Storage, Packing and Shipping	10
Shoe Manufacturing (Rubber):	
Washing, Coating, Mill Run Compounding	10
Varnishing, Vulcanizing, Calendering, Upper and Sole Cutting	C*
Sole Rolling, Lining, Making and Finishing Processes	C*
Soap Manufacturing:	
Kettle Houses, Cutting, Soap Chips and Powder	10
Stamping, Wrapping and Packing, Filling and Packing Soap Powder	20
Steel and Iron Manufacturing:	
Billet, Blooming, Sheet Bar, Skelp and Slabbing Mills	5
Boiler Room, Power House, Foundry and Furnace Rooms	5
Hot Sheet and Hot Strip Mills	10
Cold Strip, Pipe, Rail, Rod, Tube, Universal Plate and Wire Drawing	10**
Merchant and Sheared Plate Mills	15*
Tin Plate Mills—	
Hot Strip Rolling and Tinning Machine Dept.	10
Cold Strip Rolling	15
Inspection—	
Black Plate	C*
Bloom and Billet Chipping	C*
Tin Plate and Other Bright Surfaces	B* D*
Machine Shops and Maintenance Department	
Repair Shops—	
Rough Bench and Machine Work	10
Medium Bench and Machine Work	20
Fine Work — Buffing, Polishing, etc.	B*
Extra Fine Work	A*
Blacksmith Shop	10
Laboratories (Chemical and Physical)	15
Carpenter and Pattern Shop	20
Storage	2
Stone Crushing and Screening:	
Belt Conveyor Tubes, Main Line Shafting Spaces, Chute Rooms, Inside of Bins	5
Primary Breaker Room, Auxiliary Breakers under Bins	5
Screens	10
Storage Battery Manufacturing:	
Molding of Grids	10
Store and Stock Rooms:	
Rough Bulky Material	5
Medium or Fine Material Requiring Care	10
Structural Steel Fabrication:	10
Sugar Grading	30
Testing:	
Rough	10
Fine	20
Extra Fine Instruments, Scales, etc.	A*

* See reference footnote at end of table.
† An I. E. S. research study of lighting in this industry is now in progress.

TABLE 8—(Cont.)

Textile Mills (Cotton):	
Opening, Mixing, Picking, Carding and Drawing...	10
Slubbing, Roving, Spinning	20
Spooling, Warping on Comb	20
Beaming, and Slashing on Comb—	
Grey Goods	20
Denims	B*
Inspection—	
Grey Goods (Hand Turning)	C*
Denims (Rapidly Moving)	A*
Automatic Tying-In, Weaving	B*
Drawing-In by Hand.....	A*
Silk and Rayon Manufacturing:	
Soaking, Fugitive Tinting, and Conditioning or Setting of Twist..........	10
Winding, Twisting, Rewinding, and Coning, Quilling, Slashing	30
Silk and Rayon (Cont.)	
Warping (Silk or Cotton System)	
On Creel, on Running Ends, on Reel, on Beam, on Warp at Beaming	C*
Drawing-In—	
On Heddles	A*
On Reed	A*
Weaving—	
On Heddles and Reeds..	5
On Warp Back of Harness	10
On Woven Cloth.......	30
Woolen:	
Carding, Picking, Washing, Combing	10
Twisting, Dyeing	10
Drawing-In, Warping—	
Light Goods	15
Dark Goods	30
Weaving—	
Light Goods	15
Dark Goods	30
Knitting Machines	20
Tobacco Products:	
Drying, Stripping, General	10
Grading and Sorting......	A*
Toilets and Wash Rooms	5
Upholstering—Automobile, Coach Furniture	20
Warehouse	5
Woodworking:	
Rough Sawing and Bench Work	10
Sizing, Planing, Rough Sanding, Medium Machine and Bench Work, Gluing, Veneering, Cooperage ..	20
Fine Bench and Machine Work, Fine Sanding and Finishing	C*

** In these areas many of the machines require one or more supplementary lighting units mounted on them in order effectively to direct light toward the working points.

* Lighting recommendations for the more difficult seeing tasks, as indicated by A, B, C and D in the foregoing table, are given in the following:

Group A:

These seeing tasks involve (a) the discrimination of extremely fine detail under conditions of (b) extremely poor contrast, (c) for long periods of time. To meet these requirements, illumination levels above 100 foot candles are recommended.

To provide illumination of this order a combination of at least 20 foot candles of general lighting plus specialized supplementary lighting is necessary. The design and installation of the combination systems must not only provide a sufficient amount of light but also must provide the proper direction of light, diffusion, eye protection, and in so far as possible must eliminate direct and reflected glare as well as objectionable shadows.

Group B:

This group of visual tasks involves (a) the discrimination of fine detail under conditions of (b) a fair degree of contrast (c) for long periods of time. Illumination levels from 50 to 100 foot candles are required.

To provide illumination of this order a combination of 10 to 20 foot candles of general lighting plus specialized supplementary lighting is necessary. The design and installation of the combination systems must not only provide a sufficient amount of light but also must provide the proper direction of light diffusion, eye protection, and in so far as possible must eliminate direct and reflected glare as well as objectionable shadows.

Group C:

The seeing tasks in this group involve (a) the discrimination of moderately fine detail under conditions of (b) better than average contrast (c) for intermittent periods of time.

The level of illumination required is of the order of 30 to 50 foot candles and in some instances it may be provided from a general lighting system. Oftentimes, however, it will be found more economical and yet equally satisfactory to provide from 10 to 20 foot candles from the general system and the remainder from specialized supplementary lighting. The design and installation of the combination systems must not only provide a sufficient amount of light but also must provide the proper direction of light, diffusion, eye protection, and in so far as possible must eliminate direct and reflected glare as well as objectionable shadows.

Group D:

The seeing tasks of this group require the discrimination of fine detail by utilizing (a) the reflected image of a luminous area or (b) the transmitted light from a luminous area.

The essential requirements are (1) that the luminous area shall be large enough to cover the surface which is being inspected and (2) that the brightness be within the limits necessary to obtain comfortable contrast conditions. This involves the use of sources of large area and relatively low brightness in which the source of brightness is the principal factor rather than the foot candles produced at a given point.

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3. Where practicable, dry standing room should be provided for employees. Where employees are required to do work outside of their usual duties in which it is not possible to provide dry standing room, they should be furnished, when practicable, suitable waterproof footwear.

4. Workers should be instructed in the use of and the necessity of using the personal protective equipment, and employers should take steps to require the employees to use such equipment.

5. Masks and respirators should not be used in lieu of exhaust ventilation or other methods for controlling dust, gas, fume, vapor, or mist hazards.

6. Suitable types of protective clothing in good condition should be furnished to workers exposed to injury hazards from physical contact with materials, such as goggles for protection against flying objects or metal splashes, safety hats or helmets, and safety shoes for protection against falling objects, fire-resisting leggings for protection against molten metal, leather or asbestos aprons for protection against sharp edges, splinters, or electric shocks, etc.

7. Wherever the nature of the work is such that the employees' clothing becomes covered with or permeated with industrial poisons, the employer should provide necessary equipment and help to cleanse such clothing as often as may be necessary.

CONTROL OF DUSTS, FUMES, VAPORS AND GASES

1. Every source of air contaminant should be controlled by one or more of the following methods:
   a. Segregation or isolation of source
   b. The use of local exhaust ventilation
   c. Wet methods (for dust control)

2. Wherever a substance producing contamination can be replaced by a less hazardous material without increasing the degree of air contamination or interfering with the manufacturing process, replacement should be made.

3. When a process giving rise to atmospheric contamination can be altered or substituted by another which either eliminates the contamination or reduces its extent, consideration should be given to such alterations or substitutions.

4. All control equipment should be inspected at regular intervals and any defects noted should be repaired immediately.

5. A periodic check upon the performance of control equipment should be made by means of air samples taken by an approved technic.

SAMPLING

1. Samples should be taken wherever there is a known or suspected source of air contamination.

2. Samples should be taken at the breathing level of the workers exposed, special emphasis being given to the locations nearest the source and those in the path of air currents carrying the gas.

3. Before entering any space not frequently used, and suspected of containing a noxious gas or vapor, air samples should be taken to determine the amount present.

4. Samples should be taken at sufficient intervals of time so that any variations in concentration will be evident.

5. When an automatic recording device is used, it should be operated continuously during the working period.

6. When indicators are used, half-hour readings during the working period should be taken.

7. When vacuum flasks or liquid displacement methods are used for sampling gases or vapors, samples should be taken at half-hour intervals during the working period.

8. Samples should be taken in sufficient number to avoid any reasonable doubt of the results found.

9. If only one sampling point is deemed necessary, the samples should be taken in triplicate. If numerous locations are to be sampled, representative points may be selected among them.

10. Indicators and recorders should be operated in accordance with the directions furnished by the manufacturer.

11. If samples are taken of any occupation entailing a variety of activities, careful time studies should be made, and samples taken representative of each activity. The exposure determined should be weighted in accordance with the time spent in each activity.

12. Whenever possible, samples should be taken by recognized technics by trained personnel.

PRINCIPLES RELATING TO RECORDS AND POSTING OF NOTICES

The keeping of records and posting of notices must be regarded as much a part of industrial hygiene as many of the requirements previously listed. Not only do records measure progress in the control of specific hazards, but also if such items as labor turnover, injuries received, or illnesses treated, to men-

tion a few, are available for analysis, they may often reveal significant facts pertaining to unsuspected hazards. Posters when properly prepared and displayed are valuable adjuncts for the education of employees in matters of personal hygiene and accident prevention.

KEEPING RECORDS

1. Every employer should keep a record of all major changes in the plant which in any way may affect the environment of the employee.

2. Every 6 months a tabulation of the labor turnover by department should be made and recorded on standard forms.

3. Every employer should keep a record on standard forms of all injuries which cause death or disability or require medical attention or first aid treatments received by employees in the course of their employment.

4. Within 10 days after the occurrence and knowledge of such injury, a report should be made to a responsible person and be used for analysis of causes and prevention of similar injuries.

5. Upon termination of a disability or illness, or if a disability or illness extends beyond a period of 30 days, a supplementary report should be made to a responsible person.

6. All absences taken for 1 day or more on account of injury or illness should be recorded by the foreman and referred to a responsible person. A report of every absence due to injury or illness should be made on a form provided for the purpose.

POSTING NOTICES

1. Every industrial establishment should provide one or more bulletin boards for posting notices located so as to attract the attention of every employee at some time during the working day.

2. All employees should be instructed in the hazards incidental to the work engaged in, both with regard to the individual and fellow workers. Workers who are transferred to other unaccustomed work should be instructed as to the hazards incidental to the new occupation.

3. The employer should place warning signs and instruct all employees who are required to work where industrial poisons of a hazardous nature are used, stored, or carried, regarding the danger connected with them.

CONCLUSIONS

The principles given above are not to be construed as constituting a code. They are chiefly intended to indicate the scope of industrial hygiene. It is evident, however, that the principles may form the basis for developing codes or regulations. Codes are regulatory, and are subject to enforcement. For this reason, the principles as worded in this paper are in many instances impractical, and if accepted as they stand even with the substitution of the word "shall" for "should," may lead to much confusion. A principle may express a desirable objective, but if it cannot be enforced it has no place in a code.

The field of industrial hygiene is specialized to a certain degree, but it is definitely a part of public health administration. Of late years, there has been a tendency, particularly among engineers, to regard industrial hygiene as a definite profession, distinct say from sanitary or public health engineering. This tendency is to be deplored. It arises from present-day university curricula in the last two fields mentioned. A close study of the principles demonstrates clearly that industrial hygiene is precisely sanitary or public health engineering as we understand them, with a special emphasis on the industrial environment. There is no apparent reason why instruction in air sanitation and industrial poisons should not form a part of sanitary or public health engineering in our universities. In fact, sanitation and industrial hygiene engineering could be merged into the profession of public health engineering. Otherwise, the constant subdivision of engineering into specialized domains will mitigate against the best interests of all concerned.

Finally, with regard to the medical and engineering aspects of the basic principles, one more fact must be

stressed. Industrial hygiene offers a method of attacking general problems of public health administration. Because industrial hygiene establishes contact with a large section of our population, and keeps it under close observation, there is an opportunity to practise preventive medicine at a low cost to the community. Industrial hygiene should not be restricted to the control of occupational diseases. From the standpoint of public health it offers an opportunity to extend the treatment of venereal diseases as well as the determination and control of malnutrition, tuberculosis, and other diseases. If a worker is found to be suffering, say, from tuberculosis, not only are fellow workers protected by treating the individual but also the immediate family, because the discovery of such a case leads the health officer to consider the home environment. Thus, industrial hygiene simplifies the task of the public health administrator, who in the normal course of events must wait until the case comes to the attention of the family physician or a clinic. The opportunity to reach large sections of the population in this manner cannot be overemphasized. These are considerations which have been incorporated in the basic principles set down in this paper.

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Some Notes on Sanitary Land-fills*

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THE disposal of garbage, refuse, and ashes, by using them to fill in low or swampy areas, has been utilized by many municipalities throughout the world. As used in the past, this method of disposal grew into disfavor and was largely abandoned. E. J. Cleary [1] writes:

> A modernized version of refuse disposal on dumps, which minimizes the objectionable features heretofore associated with that method of handling waste, has been developed by the New York City Department of Sanitation. What recommends it for attention is its low cost and adaptability to many localities where refuse disposal is an expensive and troublesome problem.

The procedure for making a land-fill as described by Cleary is essentially as follows: Most of the sites selected for land-fills have been just above tide level and are covered with a dense growth of marsh vegetation. A drag line excavating machine digs a trench some 30 ft. in width, and 4 to 6 ft. in depth, ahead of the edge of the fill. This excavated material is later used for cover material. The trucks of mixed refuse are dumped on top of the completed parts of the refuse-fill, about 50 ft. from the edge of the fill which borders the trench. A Bulldozer then spreads the piled material by pushing it toward and over the edge into the trench, the Bulldozer compacting the fill as it moves back and forth over it. Load after load is dumped until the fill is built up to the desired level (usually about 12 ft. layers).

Part of the excavated material is spread over the exposed surface of refuse to cover it for a depth of 9 to 14 in. for the first cover. The deposited material is covered with an earth seal every second or third day. Later the final earth covering is placed with a minimum depth of 2 ft. of earth.

The land-fill method of disposal is frequently the cheapest, and often may pay returns in reclaimed land and improved conditions. It is still on an entirely empirical basis and has not been given a fraction of the scientific study bestowed upon all other methods of garbage and refuse disposal. Considering the possible economy and other possible advantages of the method, this oversight should be rectified. Little is known as to what goes on in a land-fill. The conditions and rates of decomposition, effect of mixtures, depth of fill, depth of soil cover, or character of soil cover, rate of settlement and consolidation of fill; their bearing power and drainage, and numerous other factors should be explored in an orderly and scientific fashion before it can be said with reason that the land-fill method is or is not economical, whether it is or is not a menace to health and safety; whether it can or cannot pro-

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duce advantageous results; and if it should be considered as an acceptable method of disposal, what limitations there may be and under what conditions it may properly be used.

To determine these and other factors, a coöperative WPA project has been organized with the Department of Sanitation of New York City as sponsor, and with the general direction of the work being under the Sanitary Engineering Division of the College of Engineering of New York University. The study is being made to answer three main questions:

1. What is the most efficient practice with respect to land-fill?
2. What are the possibilities of using garbage filled lands for structural purposes?
3. What are the physical and biological aspects of garbage decomposition?

Since February, 1939, experimentation has been going on in an attempt to explore these and other pertinent factors. Observations without conclusions will be offered in this paper because not enough work has been done from which to draw conclusions. Of necessity all remarks refer to conditions as they now exist in New York City.

COMPOSITION OF LAND-FILL MATERIAL IN NEW YORK CITY

The composition of the refuse as delivered to, and placed in, land-fills was determined by classifying truck-loads from selected geographical areas. The contents of a truck are dumped near land-filling operations and the refuse manually sorted, weighed, and volumetrically measured.

The results of classifying 107 truck-loads at two fills according to the percentage distribution by weight appears in Table 1. The results are based on the weights of material as received, irrespective of the moisture content. Truck-loads having minimum and maximum organic fraction (food refuse, paper, wood, rags, etc.) and the average analysis of 57 truck-loads at land-fill "A" and 50 truck-loads at land-fill "C" appearing in Table 1

TABLE 1

Composition of Mixed Refuse Delivered at Land-fills
Percentage Distribution by Weight

	Land-fill "A"			*Land-fill "C"*			
Classification	*Min. Organic*	*Max. Organic*	*Average*	*Min. Organic*	*Max. Organic*	*Average*	*Average Fills "A" and "C"*
Food refuse	0.61	34.16	9.04	2.65	8.55	4.87	6.93
Paper	16.27	45.51	24.68	7.46	26.26	11.41	17.96
Wood	4.18	1.39	3.33	0.55	2.04	0.57	1.94
Misc.*	3.03	6.80	3.64	0.29	0.90	0.92	2.26
Metal	6.77	5.51	6.84	2.48	6.70	4.11	5.37
Glass	24.03	6.01	5.23	1.62	4.35	3.03	4.13
Ashes	45.11	0.62	47.24	84.95	51.20	75.09	61.41
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Food refuse and paper	16.88	79.67	31.72	10.11	34.81	16.28	24.89
Food refuse, paper, wood and misc.*	24.09	87.86	38.69	10.95	37.75	17.77	29.09

Percentage Distribution of Food Refuse Component

	Land-fill "A" Average	Land-fill "C" Average	Average Fills "A" and "C"
Baked goods	13.6	12.5	13.3
Vegetables	25.4	28.1	26.4
Citrus	26.6	38.6	30.9
Greens	31.3	9.7	23.5
Meat	3.1	2.0	0.9
Misc.	...	9.1	5.0
Total	100.00	100.00	100.00

* Leather, linoleum, rags, leaves, grass, etc.

TABLE 2

Composition of Mixed Refuse Delivered at Land-fills
Percentage Distribution by Volume

Classification	Land-fill "A" *Min. Organic*	Land-fill "A" *Max. Organic*	Land-fill "A" *Average*	Land-fill "C" *Min. Organic*	Land-fill "C" *Max. Organic*	Land-fill "C" *Average*	*Average Fills "A" and "C"*
Food refuse	0.56	34.16	6.52	4.45	10.79	5.67	6.15
Paper	39.31	45.51	46.84	33.40	38.36	41.98	44.75
Wood	8.98	1.39	8.06	1.11	3.36	0.95	4.99
Misc.*	6.73	6.80	6.01	0.37	1.44	1.32	3.98
Metal	10.66	5.51	10.57	7.79	13.67	9.11	9.94
Glass	19.17	6.01	3.08	1.67	3.60	2.54	2.84
Ashes	14.59	0.62	18.92	51.21	28.78	38.43	27.35
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Food refuse and paper	39.87	79.67	53.36	37.85	49.15	47.65	50.90
Food refuse, paper, wood, and misc.*	55.58	87.86	77.43	39.33	53.95	49.82	59.90

* Leather, linoleum, rags, leaves, and grass.

show the degree of variation found and a comparison of the variation of garbage-refuse received at the two land-fill sites.

The volumetric distribution of materials found in 57 trucks delivered at land-fill "A" and 50 trucks delivered at land-fill "C" are given in Table 2.

Although wide variation is shown in both the weight and volumetric distribution of truck contents, the weighted average "organic fraction" of 107 trucks was found to be 29.09 per cent by weight and 59.9 by volume. The weighted average food refuse fraction was found to be 6.93 per cent by weight and 6.15 per cent by volume. The recognizable components of the garbage or food refuse fraction, also shown in Table 1, indicate their average distribution. A weighted average of 80.8 per cent of the food refuse is accounted for as vegetable and fruit waste.

These measurements were made during the late fall and winter.

PHYSICAL AND CHEMICAL ANALYSES

The physical analysis of sanitary land-fill material consisted of mechanically separating and classifying the coarse materials of definite composition. A chemical analysis was then made of materials of indefinite composition and source. Considering the heterogeneity of such material, the proper correlation of the data from various scientific, engineering, and public health aspects necessarily requires the analyses of a large number of samples in order that the results shall be representative.

Sampling Procedure—A coördinated grid of 100 ft. squares was established on each fill, and 8 in. diameter holes were dug at the corners of each 100 ft. square. Each hole was dug by spading off the top covering over an area 3 ft. in diameter before sinking a hole in the center of this circle. The material removed from the first 2 ft. depth from each of the 4 holes in a square was brought to an 8 ft. clean tarpaulin and composited. By the method of quartering, a composite sample was obtained, placed in a 1 gallon compression tin can, and transported to the laboratory.

Similar composite samples were likewise collected in 2 ft. strata at the middle and at the bottom of each fill. In one old fill having a total depth of 40 ft., 1 cu. ft. samples for compositing were readily obtained at every 5 ft. depth from the face of recent excavations.

Mechanical Classification of Samples—The composited gallon samples were weighed to the nearest gram, and spread out on a tray to an average depth of 1 in. and placed in a forced draft air drying oven and dried to constant weight. The air dried sample was now mechanically classified into mineral, metal, and wood constituents retained on both a 2 and 4 mesh screen. One to 2 lb. of the residual material which passed through the 4 mesh screen (or did not fall into the above classification) was taken by the method of quartering and sieved through a 14 mesh screen. All materials retained on this screen which proved to be other than coal, ashes, clinkers, metal, and stone were thoroughly macerated and combined with the material which passed through the screen. The resulting 14 mesh material was weighed and ground to pass a No. 40 screen before ignition of a 2 gm. sample to determine the volatile and fixed solids.

The weighed material passing 14 mesh screen (residue) was mechanically ground until it passed a 40 mesh screen. It was then stored pending chemical analysis. Determination of moisture in the air dry sample, volatile, solids or loss on ignition, and fixed solids were made on these samples.

In summary, the classification made is as follows: moisture; air dry No. 2 mesh mineral, metal, and wood solids; air dry No. 4 mesh mineral, metal, and wood solids; volatile and fixed solids of mineral (ashes) and coal retained on No. 14 mesh screen; and the moisture, volatile, fixed solids, etc., of "residue" which contained the dust, sand, silt, paper, leather, and other material not identified in the above classification.

Results—The results of 285 completed physical and chemical analyses are summarized in Table 3. The high quantity of relatively coarse mineral and ashes retained on 14 mesh screen remaining after a few months in a fill are of interest. These materials account for roughly one-half to two-thirds of the dry solids. The bulk of the remaining material is also relatively inert. Less than 5 per cent of the bulk dry solids (2.69 to 5.15 per cent volatile solids) in fill material over 4 months old are available for further microbiological decomposition. The residue volatile solids appear to indicate more rapid decomposition near the fill surface and continued decomposition after 4–8 months. The majority of microbial decomposition occurs during the first 4 months as indicated by the moisture corrected organic fraction of

TABLE 3

Physical and Chemical Analysis of Sanitary Land-fill
Grams of Solids in 100 Grams of Fill

Description	Fill "C"					Fill "D"		Fill "E"
Age of Fill	→ 9–14 Months			4–8 Mos.	9–14 Mos.	1–12 Mos.		30–35 Yrs.
Depth (feet)	0–2	3–7	8–14	0–14	0–14	2–4	6–12	0–40
No. Analysis	9	27	27	76	63	32	36	78
Moisture (per cent wet)	14.95	19.71	26.06	16.72	21.75	15.24	16.54	19.39
Mineral 2 mesh	8.42	5.26	5.88	7.03	5.96	5.37	4.91	6.19
Mineral 4 mesh	29.62	33.62	36.93	28.05	34.54	16.98	19.20	30.99
Metal 2 mesh	0.0	0.06	0.13	0.19	0.08	1.12	0.76	0.14
Metal 4 mesh	0.51	0.23	0.14	0.01	0.23	0.56	0.71	0.05
Wood 2 mesh	0.15	0.18	0.36	0.20	0.25	0.38	0.37	0.36
Volatile 14 mesh	3.28	2.86	2.62	2.87	2.82	3.42	3.46	3.63
Fixed 14 mesh	24.28	21.55	19.91	21.98	21.26	14.19	15.82	19.21
Residue moisture	0.38	0.42	0.48	0.37	0.43	0.36	0.30	1.22
Residue volatile	2.69	3.21	2.86	3.57	2.96	4.63	3.94	5.15
Residue fixed	29.58	31.12	27.73	34.54	29.32	52.36	49.93	31.92
Loss	1.09	1.50	2.96	1.22	2.15	0.63	0.60	1.12
Per cent volatile in residue	9.10	10.30	10.30	10.3	10.1	8.55	7.90	16.15

average truck contents (Tables 1 and 2).

Unfortunately the method selected does not differentiate between coal dust, stable organic matter, and unstable or undecomposed organic matter. Analyses are now under way on the above samples to differentiate these substances more effectively.

BACTERIOLOGICAL ANALYSIS OF LAND-FILL MATERIAL

The composited 1 gallon field samples were thoroughly mixed before diluting a 200 gm. "wet" weight to a fixed volume of 200 or 400 cc. Decimal geometric dilutions of this suspension were prepared and appropriate liquid or solid media were inoculated.

Choice of Analysis and Methods—The bacteriological analysis was limited to the determination of (a) *Escherichia coli,* (b) total coliform organisms, (c) "anaerobic lactose fermenters," (d) total plate count (37° C. for 24 hrs.), (e) total plate count (20° C. for 48 hrs.), and (f) thermophilic organisms.

Escherichia coli were determined on triplicate lactose broth tubes for each dilution, incubated at 37° C. Gas in 24 hours was considered positive, but positive gas formation during the second 24 hrs. was confirmed on eosin-methylene-blue agar plates. Only typical Escherichia colonies were noted and the density per gm. of land-fill recorded with the aid of McGrady's tables.

The total coliform density was determined by confirming the 24–48 hr. lactose broth positive gas tubes with brilliant green bile fermentation tubes according to *Standard Methods.* McGrady's tables gave the most probable density of organisms.

All positive gas lactose fermentation tubes after 48 hrs. incubation which did not confirm were used to enumerate the probable density of "anaerobic lactose fermenters." Obviously no value could be recorded if all positive gas tubes did confirm. It is further appreciated that the gas evolved in an unconfirmed presumptive test may not be due to anaerobic organisms in symbiosis with aerobic non-gas forming organisms.

Total plate counts on duplicate nutrient agar dishes per dilution were determined according to *Standard Methods of Water Analysis.*

Thermophilic organisms were determined in triplicate lactose broth fermentation tubes per dilution and incubated for 6 days at 58° C. Observation of gas, surface growth, and turbidity was made after 3 and 6 days.

Bacteriological Results of Land-fill Study—The results available are presented in Table 4 showing the minimum, maximum, and average density per gm. of "wet" land-fill material

TABLE 4

Bacteriological Analysis of Land-fill Material
Number of Organisms per Gram of Fill

	Minimum	*Maximum*	*Average*
Escherichia coli	0	500,000	333.000
Coliform	0	900,000	740,000
Anaerobic lactose fermenters	0	2,500,000	1,460,000
Total count (24 hr. 37° C.)	0.6×10^6	600×10^6	150×10^6
Total count (48 hr. 20° C.)	0.19×10^6	600×10^6	198×10^6
Thermophilic organisms			
3 day gas	0	90	10
6 day gas	0	25,000	1,360
3 day surface growth	0	40,000	3,080
6 day surface growth	0	190,000	13,200
3 day turbidity	0	90,000	10,700
6 day turbidity	0	190,000	23,600

TABLE 5

Natural Leachate Analysis

	Minimum	*Maximum*	*Average*
pH	5.7	8.4	6.9
T. Alkalinity p.p.m. ($CaCO_3$)	100.0	9,450.0	2,867.0
T. Acidity p.p.m. ($CaCO_3$)	25.0	4,000.0	1,089.0
Dis. Oxygen p.p.m.	0.0	5.6	1.2
B.O.D. 5 day p.p.m.	5.9	7,330.0	1,937.0
Chloride p.p.m.	280.0	12,300.0	2,406.0
Escherichia coli No./cc.	0.7	45,000.0	2,450.0
Total Count (24 hr. 37° C.) No./cc.	545.0	3,000,000.0	344,000.0

collected from several land-fills less than 2 years old. The 22 samples tested were collected from various depths below the top covering.

Natural Leachate Analysis—Upon boring holes to the bottom of a land-fill, a water table was encountered at various depths. This condition did not particularly interfere with the collection of field samples, but if the hole was not disturbed for 12 hrs., a sample of liquid leachings could be obtained. Twenty-eight such samples, uncontaminated by rains in the interim, were collected, and the unfiltered, settled liquid was tested according to methods outlined in *Standard Methods of Water Analysis*. The results of these natural leachate samples are summarized in Table 5.

In addition, 12 samples of fill drainage or stagnant bodies of water near the fill operation were tested. Maximum values for pertinent analyses are as follows: B.O.D. 5 day—170 p.p.m.; coliform organisms—9,500 per cc.; total count (24 hr. 37° C.)–33,000; NH_3–N–62 p.p.m.

GAS ANALYSIS

The study of the composition of gas found in sanitary land-fills was made to obtain information relative to: corrosion of structural material, fire hazard, the anaerobiosis of microbial decomposition, the possible accumulation of microbial waste products which might adversely affect the rate of stabilization, etc. These studies are made in the field with a portable gas analysis apparatus. Representative samples are withdrawn from different levels of the land-fill by means of capillary glass tubing inclosed in an iron pipe housing that is progressively driven into the land-fill as described elsewhere.[2]

Results obtained on a sanitary land-

TABLE 6

Composition of Gas in Land-fill "F"

Percentage Found in 2 Foot Level (A) and 2¼–4 Foot Level (B)

Sample No.	*Carbon Dioxide*		*Oxygen*		*Methane*		*Hydrogen*		*Nitrogen*	
	A	*B*	*A*	*B*	*A*	*B*	*A*	*B*	*A*	*B*
51	1.0	2.0	10.0	4.0	0.0	0.0	0.0	0.0	89.0	94.0
70a	11.0	11.5	7.2	6.3	5.1	4.9	0.0	0.0	76.7	77.3
70b	12.3	10.4	3.0	4.8	0.0	0.0	0.0	0.0	84.7	84.4
71	16.4	17.0	0.6	1.0	0.0	1.7	0.0	0.0	83.0	81.3
70c	18.5	20.8	2.3	2.0	23.0	28.5	0.0	0.0	56.2	48.7
62	18.1	23.7	2.9	0.2	28.5	41.0	0.4	0.0	51.2	35.1
63	22.9	28.3	2.0	0.0	32.8	46.3	2.2	0.0	30.1	24.9
68	24.8	24.6	4.5	5.5	50.8	45.5	0.8	0.6	19.1	23.8
67	29.2	35.8	0.8	0.6	56.0	54.5	0.0	1.5	14.1	7.7
65	23.5	31.1	0.5	0.1	51.6	57.0	0.2	0.4	19.4	11.5
69	29.8	34.0	2.1	1.0	46.9	57.7	0.0	1.6	21.2	5.7
66	34.0	35.4	1.6	0.6	64.0	64.0	0.0	0.0	0.4	0.0
53	28.5	27.4	0.0	0.0	64.3	65.3	0.0	0.0	7.2	7.3
61	27.7	27.4	0.0	0.0	59.7	67.4	1.7	0.4	11.0	4.8
64	22.7	23.7	0.3	0.3	29.8	32.5	0.0	0.7	46.8	32.9

fill 2–4 years of age and having a water table less than 6 ft. below the covered surface are presented in Table 6. Except in a few instances the gas found at the 2 ft. level (just below the earth covering) had high carbon dioxide (10–35 per cent), high methane (20–65 per cent), traces of hydrogen and oxygen, and a variable nitrogen content (0.0–50 per cent). Almost invariably the gas found at lower levels (2½ to 4 ft.) was somewhat richer in carbon dioxide and methane.

Results obtained from a land-fill having no water table in the entire depth to 1 or 2 ft. from the bottom were highly variable. Typical average results at a location with little or no water submerged refuse and a well consolidated loam covering are presented in Table 7. Of particular significance is the relatively low methane content (1.7–6.6) and the high carbon dioxide content (22.2–33.9) both of which increased somewhat with depth. Apparently, depending on the type of covering, the quantity of water submerged refuse and the depth of sampling, the gases collected from this "dry" land-fill varied in composition from that of air to that indicated in Table 6.

Based on the composition of gas found in these two types of land-fill it is apparent that the type of microbiological activity differs in "wet" and "dry" land-fills.

TEMPERATURES

Temperature measurements were made in two ways: (1) A series of 1¼ in. steel pipes were placed at different depths in the newly made land-fill as close to the face of the fill as possible. The temperature of a 6 in. plug of water at the bottom of each pipe was measured with a maximum thermometer. (2) A recording thermograph bulb was buried in the fill less than 5 hours old.

The first field temperatures were made on land-fill "A" and temperature measurements started 15 days after the placing of the fill. The temperature a day later was 119° F. at 3 ft. depth; 130° F. at 7 ft. depth; while the air temperature was about 75° F. The peak temperature reached was 133° F. during the 30 days succeeding the initiation of the experiments.

A second set of readings was made on the same land-fill about 40 ft. north of Set No. 1. These measurements began 24 days after laying the fill. The maximum temperature in this fill reached 151° F. but the air temperature at that time was 92° F. Thermometers were placed at depths of 3, 7, 11 and 14 ft. The temperature of the 14 ft. depth averaged about 20° F. below the maximum which occurred at the 3 ft. depth. This land-fill was affected by tidal waters and the lower depths were subjected to occasional wetting.

A third set of readings was made on a land-fill 10 months old. Temperature readings over several months indicated that the temperature of the fill had become stabilized at or near air temperature (about 70° F.).

A series of measurements were made on land-fill "B," 18 hrs. after the laying of the land-fill on July 20, 1939, with results as shown in Table 8.

Temperature measurements indicate

TABLE 7

Composition of Gas in Land-fill "C"
Percentage by Volume

Depth in Feet	*Carbon Dioxide*	*Oxygen*	*Methane*	*Hydrogen*	*Nitrogen (by diff.)*
2	22.2	0.0	1.7	0.0	76.1
2	33.6	0.1	5.6	0.1	60.6
3	33.2	0.4	5.7	0.0	61.1
6	33.9	0.2	6.6	0.0	59.3

TABLE 8

Time after Laying Fill (hrs.)	*Temperature (3 ft. depth)*
18	110° F.
37	120° F.
107	140° F.
113	146° F.
180	148° F.
274	148.5° F.
346	146.0° F.
449	142.0° F.
540	130.0° F.
805	119.0° F.

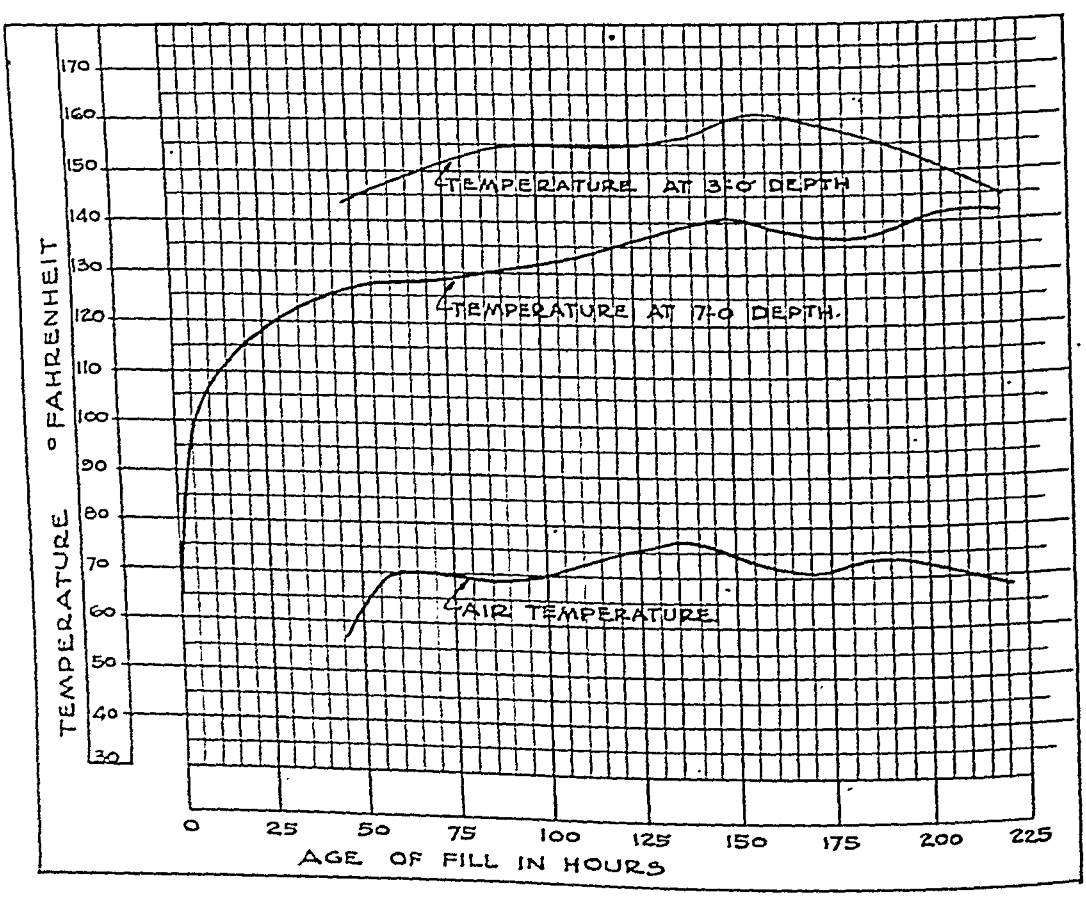
that the temperature will start rising immediately after the land-fill has been sealed, and reach a maximum in less than 10 days.

Figure 1 gives the relation between temperature and time when a thermograph was placed near the face of a new fill. This chart is typical of measurements being made indicating that the temperature in a new fill will rise to better than 100° F. within 24 hrs. and reach a maximum in very few days.

ODOR SURVEYS

Odors emanating from a land-fill are very difficult to measure accurately. Two different men were used on odor surveys, and these men made independent surveys of each land-fill many times during the summer. The method was essentially this: The observer would start from the point at which the fill was being made, record weather conditions, including relative humidity, temperature, wind velocity, and wind direction. He then recorded what odor he found at that point. By use of a compass, he walked 100 ft. to the north, again recorded weather conditions and the odor observed. He

FIGURE 1—TEMPERATURE CHART



continued in one direction until he had arrived at a point where no odor existed, recording all observations at 100 ft. intervals. He repeated this procedure until he had covered all points.

In this way, it was possible to investigate the odor situation, particularly on days of various humidities and with varying wind velocities in the four directions. During these odor surveys, 1,100 ft. was the extreme distance at which an odor was observed, and this was on a day when a 15 mile wind was blowing essentially in a northerly direction. In most cases, odors were not observed at distances over 200 ft. unless the wind was blowing somewhat in that direction. In addition to the observations made by two observers, all of the nearby homes were visited and the occupants interviewed on the subject of odors.

SUMMARY

Many of the studies contemplated in the project have not been completed. The subject of rats has been assigned to a specialist along that line, and a number of other physical features, such as settlement, structural studies, etc., are now being made.

NOTE: This investigation is being conducted by the land-fill project of the Work Projects Administration, sponsored by the Department of Sanitation of New York City, William F. Carey, Commissioner, and supervised by the Division of Sanitary Engineering of New York University. E. J. Ricer, Supervising Engineer for the Work Projects Administration, and Edward Stofka, Assistant Engineer, have been especially helpful in assisting the writers in preparation of data for this article.

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Our Nation's Health

"Today we are just beginning to catch a glimpse of the new world that would be made possible by proper international organization in all fields of work. In that new world, health and welfare for all would help to bring about conditions favoring a peaceful society within countries, and this would conduce to security in international relationships. A gradual diversion of the wealth now lavished on armies, navies, and air forces to housing, nutrition, medical care, education, and other social benefits would raise human welfare to a higher level than ever before. These benefits have been made possible by the advances of science; it is time to organize our international relationships in such a way as to make them available to the great mass of the people on this and other continents."—Frank G. Boudreau, M.D., Our Nation's Health—An International Problem, Carnegie Endowment for International Peace.

Medical Care of the Indigent Non-Hospital Contagious Patient

With Particular Reference to Whooping Cough*

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THE medical care of the indigent in New York City, a group including not only those on Home Relief, but also those whose income places them in the category of medical indigence, has always received serious attention from our health administration. The magnitude of this problem may be grasped if one studies the recent survey of hospital care in the Metropolitan area made under the auspices of the United Hospital Fund.[1]

The steady increase in dispensary attendance in New York City was shown [1] to have reached the surprising figures of 1,544,426 patients with a total of 6,923,029 visits during 1934 in a population of 7,346,007, a ratio of 1 patient to 4.6 of the population. In Manhattan, where most of our larger institutions are located, the ratio of the number of dispensary patients to the total population was much higher (1 to 2).

Along with the steady growth of our hospital units, this city has made plans for 30 health centers to be strategically located in the 5 boroughs to bring the facilities of the Health Department to local neighborhoods. Several of these centers have already been opened.

Despite all the years of building and planning and the millions of dollars spent annually, a large group of medically indigent has been overlooked. Rarely does one find that provision has been made for the underprivileged who become afflicted with a contagious disease, yet do not require hospitalization.

Most important of all these ambulatory patients are the infant and young child with whooping cough. To those who have served in a children's clinic I am sure this problem has presented itself over and over again. Perhaps some of you, who have served in a clinic where isolation facilities were inadequate, have witnessed the sad spectacle of an infant in the midst of a choking spell of whooping cough being hurried out into the street in the arms of a frantic mother by an equally frantic nurse who has become very much concerned about the other children filling the benches of the waiting room. And what do we hear as they reach the door? The mother pleads that she cannot afford a doctor, and asks where she can take her child. The reply usually is: "Take your child to the hospital for contagious diseases." "But," adds the mother; "my child is not sick, it only has whooping cough (only a disease which has a fatality of over 10 per cent for this age). Can't

* Read before the Section of Pediatrics at The New York Academy of Medicine, April 13, 1939.

you give me a bottle of medicine?" A bottle of medicine is perhaps given with the final remark: "Don't bring your child back here again until she is over the whooping cough."

How different is the situation in our clinics with adequate isolation facilities? Here too the physician, with rare exceptions, is obliged to send this patient home with perhaps a few kind words and the same bottle of medicine. There is nothing more he can do, for no provisions have as yet been made to give these patients follow-up care.

The scope of this problem extends even further since patients with bronchiectasis, tuberculosis, and other respiratory infections might easily be turned away and refused medical care because a spell of coughing common to these conditions led to an erroneous diagnosis of whooping cough.

Here let me call attention to a recent study by the Department of Welfare of New York City, on the care of 653 cases of contagion among home relief patients, for the 6 months December, 1937, to May, 1938. We find (Table 1) that among 105 cases of chicken pox 26 per cent developed some intercurrent infection (6 cases of otitis media, 5 cases of bronchitis, 3 cases of tonsillitis, and 1 case of cervical adenitis). Among the 157 cases of whooping cough, 3 cases went on to chicken pox, 1 developed scarlet fever, 6 were complicated with bronchial pneumonia, 5 with otitis media, and there was 1 case of cervical adenitis.

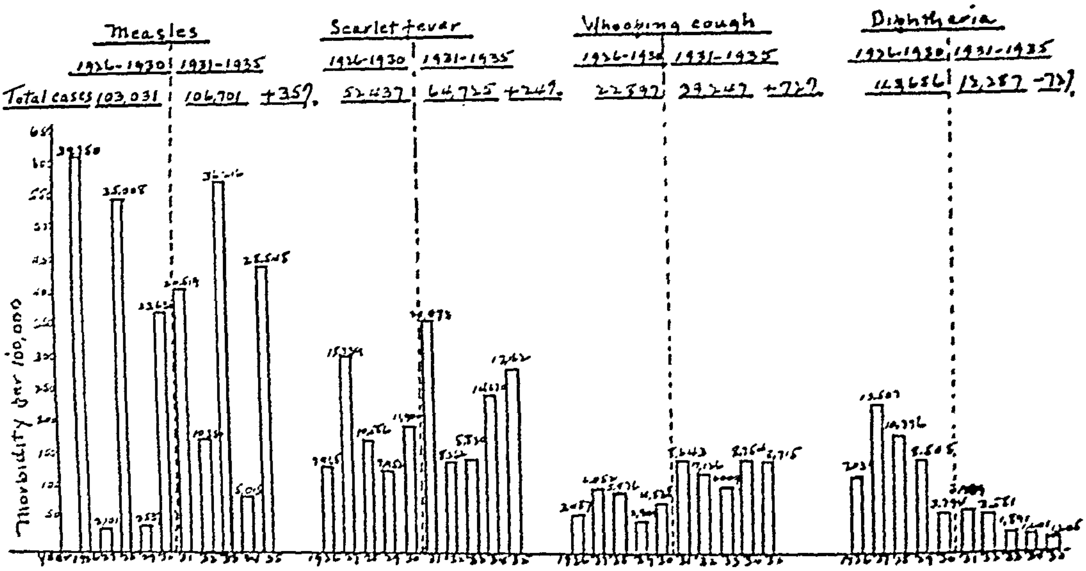
These findings may at first seem incredible. However, we must not lose sight of the fact that a large number of these indigent children are malnourished and live under conditions that make multiple infections quite common.

TABLE 1

Complications and Intercurrent Infections in 653 Cases of Contagious Diseases Treated by Panel Physicians of the Department of Welfare, New York City December, 1937, through May, 1938

Diseases	*Total Number of Cases*	*Per cent Frequency*	*Intercurrent Infections*		*Complications*	
Measles	128	25	whooping cough	(9)	bronchial pneumonia	(2)
			chicken pox	(9)	otitis media	(13)
			scarlet fever	(4)	cervical adenitis	(1)
			mumps	(1)	pyelitis	(1)
					arthritis	(1)
Mumps	138	17	whooping cough	(7)	bronchial pneumonia	(1)
			chicken pox	(7)	otitis media	(4)
					bronchitis	(4)
					cervical adenitis	(1)
Whooping cough	157	10	chicken pox	(3)	bronchial pneumonia	(6)
			scarlet fever	(1)	otitis media	(5)
					cervical adenitis	(1)
Chicken pox	105	26			otitis media	(8)
					bronchitis	(15)
					tonsillitis	(3)
					cervical adenitis	(1)
Scarlet fever	105	11			bronchial pneumonia	(1)
					otitis media	(9)
					cervical adenitis	(1)
					bronchitis	(1)
Miscellaneous	20		Varied combinations of the above complications and intercurrent infections			

CHART 1—Morbidity of Measles, Scarlet Fever, Whooping Cough, and Diphtheria in New York City, 1926–1935

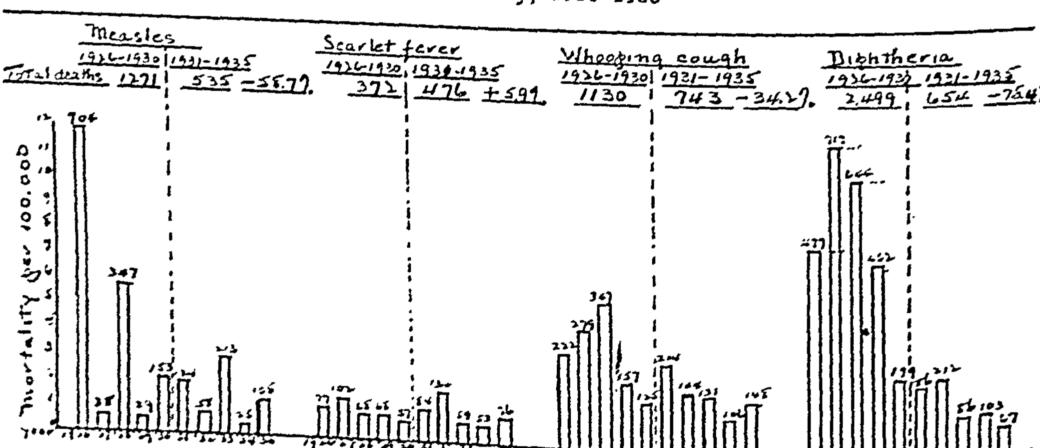


Whooping cough is known to have played havoc with our infants and young children since its first description as a clinical entity by de Ballou of Paris in the middle of the 16th century. Epidemics have been reported from every part of the globe. No climate and no race has been spared the great toll of life this disease carries with it yearly. Today it is endemic in practically all of our large cities.

In 1914 Crum[2] in a comprehensive statistical study of whooping cough over a period of 5½ years, covering 24 countries in different parts of the world, and based on a population close to 2 billion, reported that 1 per cent of the grand total of deaths from all causes was due to this disease.

Our comparative study of the four communicable diseases (measles, scarlet fever, whooping cough, and diphtheria) reported in New York City for the decennium 1926–1935, has also yielded interesting data (Chart 1). A striking drop (72 per cent) was noted in the incidence of diphtheria in the second half of this period compared

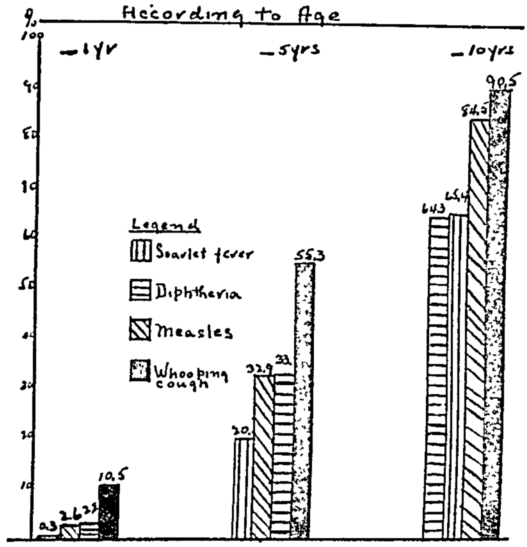
CHART 2—Mortality of Measles, Scarlet Fever, Whooping Cough, and Diphtheria in New York City, 1926–1935



with the first half; measles showed a rise of 3.5 per cent, scarlet fever 24 per cent, and whooping cough a rise of 72 per cent. Baker's figures [3] for 1906–1916 differed somewhat from ours except in respect to whooping cough, which then too showed a similar rise in incidence (80 per cent). To be sure, deductions based upon reported cases of reportable diseases are always open to criticism, and at the most, one can employ such data only to indicate a trend.

Despite this marked rise in case incidence, the mortality figures for all these diseases showed an encouraging drop (Chart 2). However, the mortality figures from whooping cough during the second half of this 10 year period exceeds that of all the other contagious diseases.

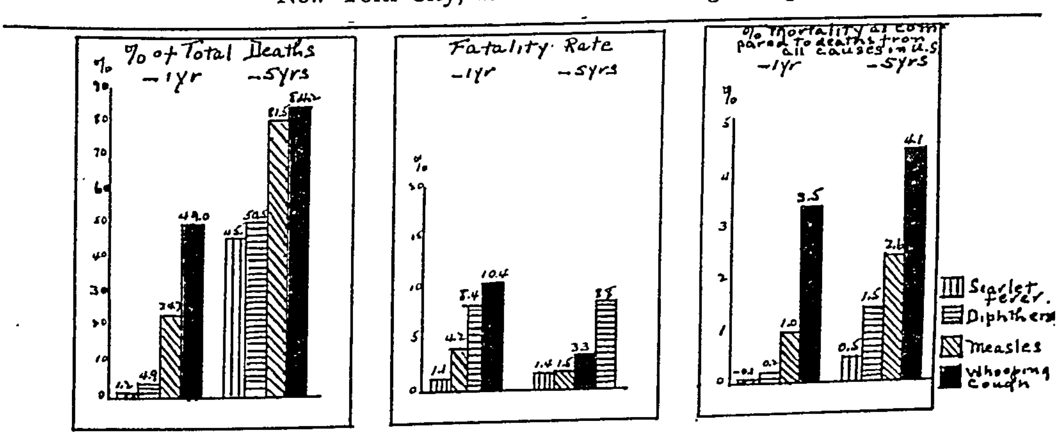
CHART 3—Per cent Morbidity of Measles, Scarlet Fever, Whooping Cough, and Diphtheria in New York City, 1932–1934—According to Age



The importance of analysis of cases according to age incidence is borne out by a survey for the years 1932–1934. During the first year of life there occurred 2.6 per cent of all cases of measles, 0.3 per cent of scarlet fever, 2.8 per cent of diphtheria, and 10.5 per cent of all cases of whooping cough. A comparatively high incidence of whooping cough was also noted in children under 5 years of age (Chart 3).

Much more impressive are the figures relating to comparative severity of whooping cough in infancy (Chart 4). Nearly half of all deaths from whooping cough occur in the first year of life, 24.7 per cent of all deaths from measles, 4.9 per cent of all deaths from diphtheria, and 1.2 per cent of all deaths from scarlet fever. A study of the mortality figures for the whole of the United States showed that whooping cough accounts for 3.5 per cent of all infant deaths under 1 year, measles for 1.0 per cent, diphtheria for 0.2 per cent, and scarlet fever for less than 0.1 per cent. Its mortality nearly equals the combined mortality for measles,

CHART 4—Mortality of Measles, Scarlet Fever, Whooping Cough, and Diphtheria in New York City, 1932–1934—According to Age



diphtheria, and scarlet fever in all children under 5 years.

The high mortality rate of whooping cough in early infancy is probably related to the type of complication to which young infants are predisposed. Thus the respiratory infections outweigh all other complications (60 per cent), and digestive disturbances follow (Table 2). Bronchiectasis and fibrosis of the lung may be discovered long afterward.

TABLE 2

1,000 Fatal Cases of Whooping Cough Showing Primary Complications (Prudential Industrial Mortality Experience, 1911–1913)

Broncho-pneumonia	286
Pneumonia	270
Bronchitis	56
Other Respiratory Diseases	15
Meningitis	44
Cerebral Congestion	9
Heart Complications	25
Digestive Complications	79
Nephritis	8
Dysentery	6
T.B.C. Lungs	9
Miscellaneous	45
No Complications	148
Total	1,000

Further tabulation of statistics is unnecessary to emphasize the serious threat to life and health which whooping cough makes in this city. The scope of this problem can scarcely be grasped from a study of published figures. Smith,[4] in his analysis of the important contagious diseases observed in the outpatient department of Bellevue Hospital, and in a few of the other leading children's clinics (Table 3), found that whooping cough exceeded by far all other contagious diseases that appeared in each of these institutions.

Our study of the hospital report sheets for contagious diseases submitted daily by the various institutions in the Borough of Manhattan to the Health Department from October 1, 1935, to September 30, 1936, is presented in Table 4. This limited survey covered a population of over 1,700,000, and may be considered representative of conditions in the other four boroughs of this city. In the 12 months during which this survey was carried on, 2,053 cases of whooping cough were reported from all sources, public and private; yet from the 30 institutions alone, a total of 1,444 cases were reported. Clinics serving congested and poorer districts reported the largest number of cases. Thus Harlem Hospital in the heart of the Negro section of Manhattan reported 362 cases, or more than twice the number from any other institution. Bellevue Hospital

TABLE 3

Prevalence of Infectious Diseases in Children's Clinics Comparative Data for Nine Institutions (C. H. Smith)

	Whooping Cough	*Chicken Pox*	*Diphtheria*	*Measles*	*Mumps*	*Total*
Bellevue, New York	578	118	43	87	78	976
Nursery and Child's New York	188	32	9	33	5	284
Mt. Sinai, New York	89	27	8	2	7	135
Post Graduate, New York			*Not Stated*			577
Children's Hospital, Boston	563	..	..	..	..	1,284
Children's Hospital, Philadelphia	72	39	26	33	48	231
Philadelphia Babies	162	31	16	25	18	319
Cincinnati General	11	7	1	1	2	24
Buffalo City	9	8	15	2	2	79

TABLE 4

Hospitals and Clinics in the Borough of Manhattan, New York City, and Number of Whooping Cough Cases Reported by Each During Year October 1, 1935–September 30, 1936

Beekman St.	24	New York Dispensary	40
Bellevue	161	New York	115
Beth David	13	New York Foundling	12
Beth Israel	19	New York Infirmary	17
Community	4	North Dispensary	14
City	10	Polyclinic	14
Flower and Fifth Ave.	30	Post Graduate	14
Good Samaritan	12	Roosevelt	13
Gouverneur	45	St. Lukes	20
Harlem	362	St. Vincent	30
Joint Diseases	80	Stuyvesant	5
Knickerbocker	6	Sydenham	6
Lenox Hill	22	Vanderbilt Clinic	123
Lincoln	14	West Side Dispensary	4
Metropolitan	68		
Mt. Sinai	147	Total	1,444

reported 161 cases, and Mt. Sinai Hospital 146 cases. The two new medical centers in this borough, which attract patients not only from their immediate neighborhood, but from all parts of Greater New York, showed 123 cases at Vanderbilt Clinic, and 115 cases at New York Hospital.

The disproportionately small number from private practice must be attributed in part to laxity in reporting. However, the important item to stress is that in a single borough, 1,444 cases of whooping cough were refused medical care in one year alone. Were it possible to learn how many additional cases developed in the same families and in other families already familiar with our present disposition of these cases, and who accordingly made no attempt to secure clinic treatment, one might record a much higher total.

The importance of the problem of the ambulatory patient with whooping cough has been stressed. However, the problem of care of the indigent confined to bed with a contagious disease, and quarantined at home because the mother for some reason cannot separate herself from her child is equally serious.

It is interesting from this standpoint to view the findings of Hume[5] in his study of the Handling of Communicable Diseases in New York State Municipalities in 1931. In his tabulation (Table 5), which covers 66 cities, and in which 39,603 cases of reported communicable diseases were studied, he

TABLE 5

Extent of Hospitalization of the Common Communicable Diseases for 1931 in a Study of 66 Cities in New York State (Hume)

Disease	*Cases Reported*	*Cases Hospitalized*	*Per cent Hospitalized*
Poliomyelitis	515	267	51
Diphtheria	737	326	44
Typhoid Fever	154	59	38
Scarlet Fever	5,106	1,744	34
Measles	11,312	494	4
Whooping cough	4,694	89	1
All other diseases	17,086	1,436	8

states that only 4,415 of these patients sought admission to the hospital. Of the cases of diphtheria, 44 per cent were hospitalized; of scarlet fever, 34 per cent; of measles, 4 per cent; and of whooping cough only 1 per cent. "These figures," says Hume, "are fairly representative of the practice of hospitalization in all of the municipalities of the state."

It is easy to understand why only 1 per cent of the cases of whooping cough are hospitalized when one recalls how commonly the child's mother dismisses the question with the statement: "My child only has whooping cough; all she needs is a bottle of medicine." Ignorance of the serious complications and sequelae of whooping cough is clearly the chief reason for its neglect. A similar ignorance exists concerning measles; to most mothers it is a disease every child is expected to have and to get over in a few days.

One need only reflect for a moment upon the great advances made in the conquest of diphtheria to realize the importance of public health propaganda. It must be obvious that only the public's ignorance of the facts concerning whooping cough is responsible for the present apathy in the face of the appalling fact that the mortality of whooping cough each year far exceeds that of each of the other contagious diseases in children. And yet, how can we hope to impress these families with the severity of this disease and the importance of proper care if we continue to turn them away when they apply for medical aid.

In so far as research is concerned, this disease is receiving a great deal of attention in laboratories throughout the world. But what of the indigent patient? There can be but one answer. This problem of whooping cough in childhood which ranks with that of tuberculosis, syphilis, pneumonia, and diphtheria, can only be solved by gaining the patients' coöperation and educating them to appreciate the severity of this disease. To accomplish this it is most important to observe and guide these patients during their illness.

One might ask: "Cannot the existing municipal and public hospitals and outpatient clinics be extended to meet this need?" It must be obvious that with rare exceptions our outpatient medical clinics cannot be utilized because we are dealing with contagious disease. To set up separate contagious clinics within walking distance of these patients' homes would entail a tremendous capital expense, and would incur a considerable public health risk if patients with contagious disease were permitted to travel through the streets or assemble in any one clinic. As for hospitalization for the duration of the infectious stage of the disease, one need only look at the cost per patient. The cost of hospitalization of a single case of whooping cough at Willard Parker Hospital in 1934 was $5.96 per day. The expense of such a procedure applied to all these patients would be prohibitive.

For the present there seems to be but one solution—to send the doctor into the homes of these patients. With the development of a properly trained personnel of physicians and nurses to administer to the medical needs of these patients and to insure proper quarantine measures, many now filling the wards of our contagious disease hospitals could be treated at home. The expense thus saved to the hospital would go far toward providing care for those patients who, up to the present time, have received no treatment whatever.

Accordingly, the following plan is proposed to aid in the working out of this idea: It is suggested that a Bureau for Home Care of Contagious Diseases be established perhaps under the supervision of the Department of

Hospitals. It is probable that a full-time director and one assistant will be required, who should make decisions on various questions and formulate policies. All calls for home care would be authorized through this bureau and referred to a visiting physician.

A panel of physicians should be drawn from among physicians who have volunteered to care for the contagious sick in their neighborhood for a set fee to be paid by the city. Every physician should be eligible. It might perhaps be advisable to give preference on this list to physicians who now offer their services in some similar capacity in the outpatient clinics of our general hospitals.

The question of eligibility of patients for this home care must be weighed carefully to prevent abuses. An ideal setup would call for the establishment of a Central Registration Bureau where all medically indigent persons would be registered and reinvestigated annually. The difficulties that now prevent the establishment of such a bureau will, it is hoped, be overcome within a few years. Meanwhile it is suggested that eligibility be limited to those who have previously been registered at one of our free general clinics where their financial status has been checked. Because of the importance to the community of prompt isolation of contagion, it is perhaps wiser to encourage rather than restrict too frequent use of the services of the Bureau for Home Care.

The care of the whooping cough patient will depend first upon the patient's age. Wherever possible, the infant in the first 3 months of life should be referred to the hospital, where transfusion or other supportive measures often indicated in these young patients can be administered, and where every effort will be made to keep the case one of whooping cough. The other children in the first year of life not so sick as to require constant watching may be seen twice a week through the first 4 weeks of the disease, and the patient then referred to the general clinic for further follow-up. The patient in the 2nd and 3rd year of life who does not require close watching may be seen at intervals of 1 week. Children beyond the age of 3 years, after a careful examination at the original visit, may be seen at intervals of 2 weeks. Every case that needs careful watching will be referred to the hospital.

This home care service should not be limited to the care of whooping cough cases alone but should extend to all the other contagious diseases where hospitalization is not indicated. The physician in the clinic and the supervisory nurse in charge should be instructed that all patients found to have a contagious disease requiring further care should be referred to this bureau. The uncomplicated case of chicken pox, German measles, and mumps should be instructed at the time the case is discovered as to further care of this condition. The patient, however, should be informed that in the event of the appearance of untoward signs or symptoms, he may call up the bureau where further instructions will be given, and a doctor sent to the home where indicated. These patients should be further directed to return to the general clinic at the end of the period of contagion for check-up and for a note permitting the patient to return to school.

This information should become common knowledge among all those coming in contact with patients falling into this category. In the event that such an uncomplicated case comes to the attention of the bureau by someone other than a physician the bureau will send one of its staff to the home to give the necessary instructions to the patient.

SUMMARY AND CONCLUSION

1. The care of the medically indigent has always received careful and serious attention of our health and hospital authorities.

2. In New York City during 1934 the total number of patients attending the free general clinics was 1,544,426—the number of visits totalled 6,923,029; a ratio of 1 patient to 4.6 of the population and one visit to 1.04 of the population.

3. Rarely do we find that provision has made for medical care to the indigent with a contagious disease when hospitalization is not indicated.

4. The case of whooping cough is stressed because of its high mortality, which far exceeds that of any other contagious diseases.

5. Of all whooping cough cases 10.5 per cent occur in the first year of life as compared to 2.8 per cent for diphtheria, 2.6 per cent for measles, and 0.3 per cent for scarlet fever.

6. Of all whooping cough cases 55.3 per cent occur in children under 5 years as compared to 33 per cent for diphtheria, 32.9 per cent for measles, and 20 per cent for scarlet fever.

7. The fatality rate under 1 year is 10.4 per cent for whooping cough, 8.4 per cent for diphtheria, 4.2 per cent for measles, and 1.1 per cent for scarlet fever.

8. Of all the deaths from whooping cough 49 per cent occur in the infant under 1 year. In measles it is 24.7 per cent, diphtheria 4.9 per cent, and in scarlet fever 1.2 per cent.

9. Whooping cough is responsible for 3.8 per cent of all the deaths from all causes in children under 1 year, and for 4.1 per cent of all the deaths in children under 5 years. In measles this figure reaches only 1 per cent in the infant under 1 year, and 2.6 per cent under 5 years. Diphtheria shows 0.2 per cent under 1 year and 1.5 per cent under 5 years. Scarlet fever 0.5 per cent under 1 year, and less than 0.1 per cent under 5 years.

10. In one year 1,444 cases of whooping cough were reported from the free clinics of the Borough of Manhattan alone; and only 2,053 cases were reported from both private and free clinics for this period. The latter figure is explained by laxity of reporting in private practice.

11. Our failure to guide these patients during the period of quarantine is undoubtedly a contributing factor not alone in the further spread of the disease but also in its high mortality figures.

12. A plan is offered whereby organized medical care at home for the indigent non-hospital patient with a contagious disease could be insured.

13. The proposed plan will allow for the care at home of many of the patients that now occupy beds in the wards of the hospitals for contagious diseases. This saving it is hoped will go a great way toward paying for those indigent patients that heretofore have been denied all medical care.

At this point it should be said that the writer is fully aware that no new ideas on the subject of contagious diseases are presented in this paper. It is simply intended again to call attention to a serious problem in public health which heretofore has failed to receive proper consideration.

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Falciparum Malaria among Drug Addicts*

Epidemiologic Studies

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IN 1929, there appeared in Cairo, Egypt, a new vogue in drug addiction. This was the intravenous use of heroin and the practice by drug addicts using heroin, of sharing a common hypodermic syringe for its administration. On this fact hinges the explanation for the occurrence, in New York City, of a disease usually uncommon, but now endemic in it—falciparum malaria.

The origin of this practice has been variously explained. It is probably related to the knowledge among drug addicts that drugs used in the treatment of helminthic and protozoal diseases are more effective when given intravenously than when taken orally. Also, heroin administered intravenously produces a more rapid and heightened effect. Furthermore, the common use of a hypodermic syringe by many drug addicts reduces the likelihood of apprehension, arrest, and conviction for the possession of drugs or apparatus for their administration. Finally, from the economic standpoint it is possible for several addicts who are unable to purchase a small quantity of the drug, by pooling their resources to be assured of at least one or more doses by the wholesale purchase.

The epidemiologic implication of such a practice in Egypt, where malaria is common, is obvious and in 1929 Biggam [1] described the first epidemic of malaria among drug addicts resulting from the common use of a hypodermic syringe. All the cases were dysenteric in type, and the parasite in each was *Plasmodium falciparum.* Shortly afterward, there appeared in the United States reports of isolated cases of this disease in drug addicts, and in 1934, Helpern [2] described 49 cases in New York City. Clinically, these cases were principally of the cerebral variety, and were associated with a very high mortality rate.

During the past 5 years, this disease seems to be well established in New York City. There are now to be seen cases of falciparum malaria among drug addicts almost at all times on the wards of Bellevue Hospital. The author has had the opportunity of studying well over 200 cases. Dr. Helpern, in a personal communication, stated that he has performed 120 autopsies on drug addicts who have died from malaria in New York City. This is only a slight indication of the probable incidence of the disease among drug addicts in New York and other large cities. The knowledge of its occurrence among drug addicts is well known to them, and many treat themselves with quinine.

* Read before the Epidemiology Section of the American Public Health Association at the Sixty-eighth Annual Meeting in Pittsburgh, Pa., October 17, 1939.

TABLE 1

A. Bellevue Hospital

	1928–1933	*1933–1938*
Average yearly admissions	59,000	61,940
Average yearly drug addicts	87	137
Av. addicts 1,000 adms. per year	1.5	2.2
Total malaria admissions	70	180
Av. malaria 1,000 adms. per year	0.24	0.50

B. Third (New York University) Medical Division

	1928–1933	*1933–1939*
Drug addicts	32	120
Total malaria	20	42
Malaria in drug addicts	0	34
Malarial fatalities	0	8

C. Types of Malaria (Third Medical Division)

	1928–1933	*1933–1939 Non-addicts*	*1933–1939 Addicts*
P. vivax	12	6	1
P. falciparum	2	1	32
P. malariae	0	0	1
Undetermined	2	1	0
Diag. on history only	4	0	0
Total	20	8	34
		42	
Fatalities	0	0	8

D. Types of Malaria, Bellevue Hospital, 1938

	Non-addicts	*Addicts*
P. vivax	7	1
P. falciparum	1	45
Total	8	46
Fatalities	0	9

E. Psychiatric Division, Bellevue Hospital, 1938

Number of admissions	26,210
Drug addicts	71
Drug addicts with malaria	27
Malaria fatalities	4

F. New York City, 1938

Types of Malaria	*Number of Cases*
P. vivax	24
P. malariae	2
P. falciparum	50
Unknown	16
Mixed	1
Total	93

TABLE 2

Mortality in Falciparum Malaria in Drug Addicts

Year	*Psychiat. Div.*		*3rd Med. Div.*		*Combined*	
	Cases	*Deaths*	*Cases*	*Deaths*	*Cases*	*Deaths*
1933	5	3	3	3	8	6
1934	2	1	7	2	9	3
1935	10	4	2	0	12	4
1936	4	2	4	0	8	2
1937	11	4	3	1	14	5
1938	23	4	12	2	35	6
Total	55	18	31	8	86	26

It is therefore likely that the number of acute patients who seek admission to the hospital represents only a small percentage of the cases among the drug addict population.

EPIDEMIOLOGY

Naturally acquired malaria is very rare in the metropolitan area of New York City. In the 5 years, 1928–1933, there were only 70 cases recorded in Bellevue Hospital. In the 5 years, 1933–1938, the period under consideration in this report, there occurred 180 cases of malaria in approximately the same number of admissions. This difference is due to the continued admission to the hospital of drug addicts suffering from falciparum malaria in the latter period.

This is borne out in the Tables (1a, 1b, 1c, 1d) by the fact that prior to 1933, when this form of malaria was first recognized, the number of cases caused by *Plasmodium falciparum* accounted for only a small number of the total, whereas following 1933 the number of cases of falciparum malaria made up by far the majority of the total.

In 1938, there were 54 cases of malaria seen in the entire hospital, of which 45 were falciparum occurring in drug addicts. There were 9 fatal cases, and these were in the addict group. There were only 8 cases in non-drug addicts and naturally acquired, of which 7 were due to *Plasmodium vivax*.

Prior to 1933, one very rarely saw a case of malaria in the Psychiatric Division of Bellevue Hospital. During the period of this study, however, more than 50 cases of malaria, all falciparum, and many of them fatal, were observed in this division.

The incidence and mortality of malaria in the metropolitan area of New York is therefore almost entirely due to the occurrence of the malignant form of the disease among drug addict population, who practise the common use of hypodermic syringes.

TRANSMISSION

The technic of injection and transmission is very simple. In some cases a complete medical hypodermic syringe and needle were used. In other instances, the apparatus is improvised by fitting a needle to the end of an eye or medicine dropper with the aid of a piece of rag or newspaper or cigarette paper. The drug is often dissolved in a teaspoon, aided by the heat of a burning match. If the injection is for one individual, he draws the drug into the syringe and attempts to insert the needle into a vein. The successful trial is known by the appearance of blood in the syringe. The drug mixed with the blood is now forced into the vein and to insure that it is all obtained,

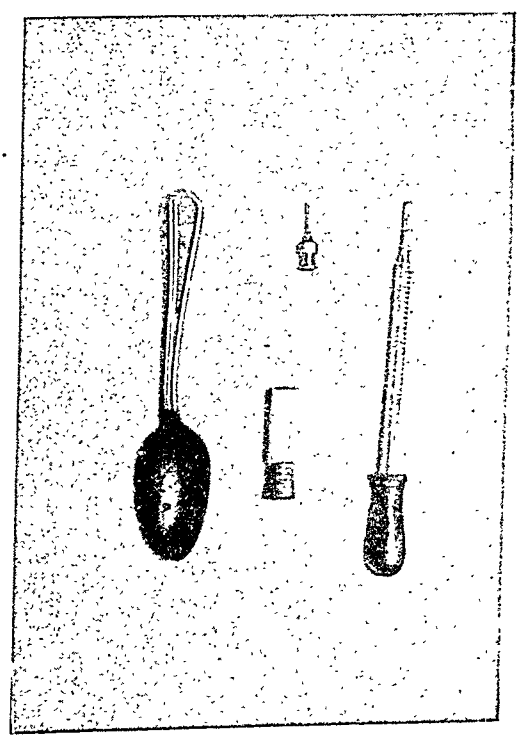


FIGURE 1—IMPROVISED HYPODERMIC APPARATUS

Improvised hypodermic apparatus for self administration of heroin. The drug shown in the vial is dissolved in the spoon and drawn up into the medicine dropper, which acts as a syringe.

the syringe is again filled with blood and the contents emptied into the vein. Frequently, another addict is waiting his turn to use the apparatus and to have his share of the drug. Without washing or other attempt at cleaning the syringe, he repeats the process described. It is obvious that if the first individual has plasmodia in his blood in fair numbers, the addict following him will not only receive his share of the drug, but plasmodia as well.

PARASITE

The outstanding species of parasite in this disease is *Plasmodium falciparum*. Although a few cases have been reported in which the parasite was either of the quartan or benign tertian variety, the majority of cases, by far, in the larger epidemics studied have been due to *Plasmodium falciparum*. In a careful study of the morphology of the plasmodium in approximately 200 cases, I have found only one infection with *Plasmodium vivax* and one with *Plasmodium malariae*. All the others were caused by *Plasmodium falciparum*.

CULTURE

Numerous attempts to culture the parasite obtained fresh from the blood of untreated individuals were unsuccessful. Often blood was used which contained an overwhelming infection and occasionally moderate or light infections were tried. Various methods and culture media were utilized. This experience coincides with that of Coggeshall[3] at the Rockefeller Institute, who made many attempts to culture the parasites obtained from the cases in the New York drug addict series.

ANIMAL INOCULATION

Efforts were made to transmit this species of plasmodium to monkeys (*Macacus rhesus*) by injecting 20 cc. of fresh, heavily infected blood intramuscularly. The monkeys failed to show evidence of infection, clinically or hematologically, and when killed later, there were no signs of malarial infection in the organs. This, too, coincides with Coggeshall's experience.

MOSQUITO INFECTION

The itinerant nature of drug addicts, the fact that many self-treated later become gametocyte carriers, and that routine blood study of many drug addicts disclosed a moderate number of symptomless carriers, made it desirable to see whether anopheline mosquitoes could be infected by feeding them on treated and untreated drug addicts.

Female *Anopheles quadrimaculatus* mosquitoes were obtained through the courtesy of Dr. Coggeshall of the Rockefeller Institute. They were allowed to feed on the thigh of a drug addict who had recovered from an attack of severe malaria, which he had contracted by the method described. The patient was afebrile and showed a moderate number of gametocytes in his peripheral blood. After the elapse of a week, Dr. Coggeshall dissected a few mosquitoes each day. The last 3 insects of 8 dissected were positive, containing 15, 21, and 23 oocysts respectively, proving the infectivity of drug addict blood containing gametocytes for anopheline mosquitoes.

If a sufficient number of addicts, whether recovered but incompletely treated, or asymptomatic carriers of gametocytes should accumulate in an area where suitable mosquitoes are abundant, a serious epidemic of malaria involving the healthy population may occur. Likewise, an epidemic may occur if a sufficient number of suitable mosquitoes should accumulate in a nonmalarious area where infected addicts are abundant.

It is of particular note in this connection that "Light Traps" for mosquitoes placed in and around New York

City and Nassau County in Long Island revealed that there was local *Anopheles quadrimaculatus* production!

CLINICAL ASPECTS OF THE DISEASE

The outstanding clinical feature of the cases seen early in the history of this disease in New York were predominantly cerebral. In fact, many of the original cases were severe instances of cerebral malaria with a high mortality rate. This feature differed from that reported in the first Egyptian series, in which dysenteric symptoms seemed to predominate almost exclusively. Some investigators felt that this difference, and the tendency for the disease to be manifest clinically through one system complex (central nervous), suggested a specific neurotropic strain of *Plasmodium falciparum* as the etiologic parasite.

Time, however, and the distribution of the disease among a fairly large number of individuals, has given us the opportunity to see the different clinical varieties of malignant malaria, including the simple, the cerebral, the dysenteric, and even the relatively uncommon " blackwater " type of *Plasmodium falciparum* infection.

The author is of the opinion that except for the non-biological mode of transmission the disease as it is seen in the drug addicts in New York or elsewhere simply represents the usual course of infections with the malignant tertian parasite, in no way different from that seen even in tropical Africa.

A complete description of the clinical

FIGURE 2—EVIDENCE OF DRUG ADDICTION

(a) Forearm of intravenous heroin addict. Note the prominent vein over the forearm and in the antecubital fossa. These veins are pigmented and often scarred and partially thrombosed.

(b) Forearm and arm of a subcutaneous heroin addict. There are numerous superficial and deep scars. The skin is pigmented and thin over healed injection sites.

syndromes encountered will be published elsewhere.[4]

GENERAL CLINICAL CONSIDERATIONS

1. *Age, Sex, Occupation, and Geographic Origin:*

There were only two females in this series and both died; one of the cerebral malaria and the other of acute diffuse glomerular nephritis.

The males were of young and middle adult age. Most of them had no given occupation; some were sailors; the rest worked at various unskilled trades when they did have a job.

The majority of the addicts lived in and about New York. Many were born in the United States, Puerto Rico, Cuba, and the West Indies. In recent years the patients have been predominantly young colored males from Puerto Rican and Negro sections of the city. Most of them had not been out of New York for many years.

2. *Onset, History, Temperature:*

There were no characteristic modes of onset. In most cases careful questioning after recovery revealed that for weeks they felt ill. In some, nausea, vomiting, and diarrhea predominated. In others they felt chills, fever and headache. In the majority the symptoms were very vague and consisted of a mixture of gastrointestinal complaints with headache, muscle pains, and chills. In a few individuals the onset was acutely progressive, so that the patient lapsed into unconsciousness very soon. No typical onset can be given. Any "queer" complaints lasting several days in the drug addicts should be regarded with suspicion.

The temperature reaction in *Plasmodium falciparum* malaria is classically unpredictable. There may be a suggestion of the tertian cycle (Figure 3, Chart 4), but in general the temperature curve follows no given pattern. Some of the cases exhibited the double daily rise (Figure 3, Chart 3) often described in malignant tertian malaria; others had quotidian fever (Figure 3, Chart 1); and others were totally irregular (Figure 3, Chart 2). The fever often showed little alteration during treatment in the fatal cases (Figure 3, Chart 1), and in the cases which recovered there was considerable fever even several days after treatment was begun. In some cases there was little or no fever. Any fever in a drug addict should be suspected of being related to malaria no matter how little the fever may be and no matter what the chart may look like.

3. *Diagnosis:*

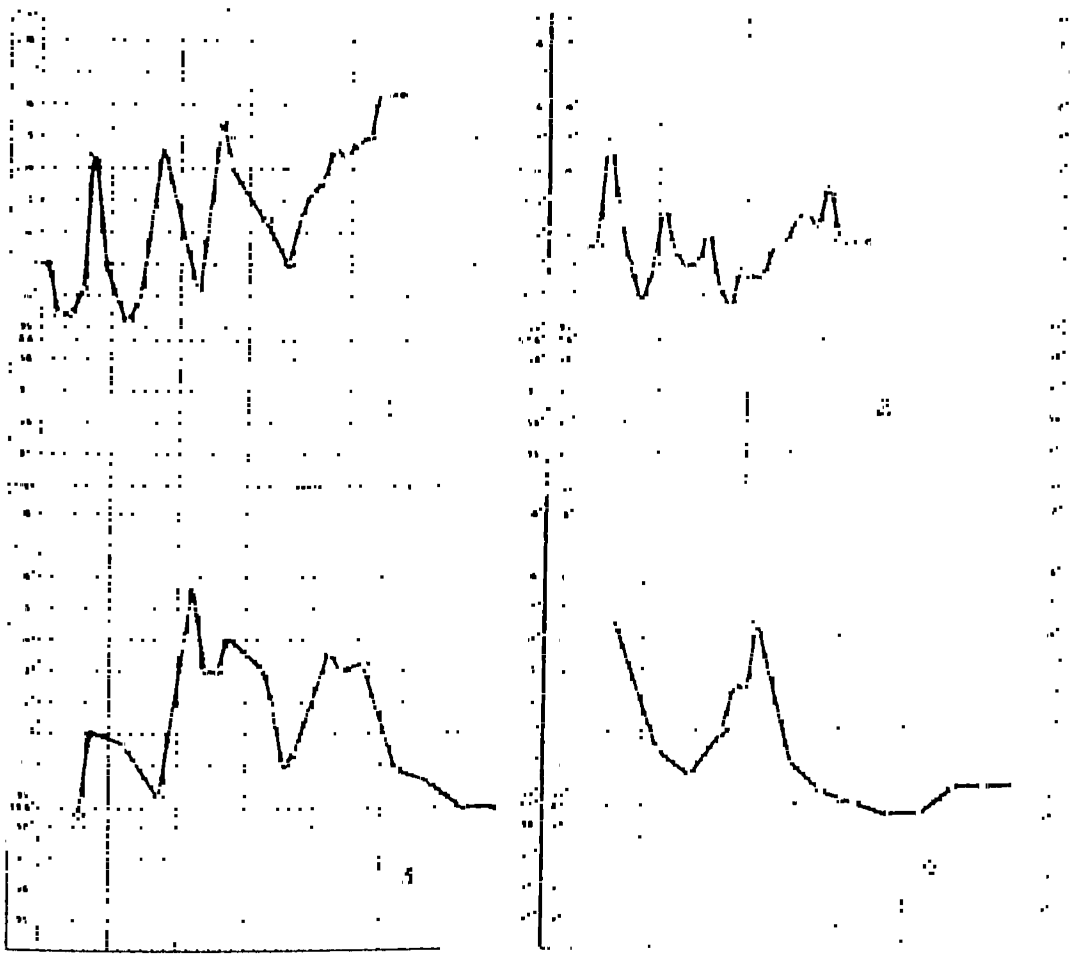
Before the disease was well known the diagnosis may have been difficult. It is easy to understand why diagnoses of various cerebral syndromes were made and why a host of other medical diseases were suspected, and to condone the errors made.

In the absence of history, the physical evidence of drug addiction (prominent superficial veins, pigmentation, scarring, thrombosis, puncture sites, and subcutaneous and superficial ulcers or scars) is the one reliable diagnostic sign (Figure 2). This knowledge and a careful examination of a properly stained blood smear are usually all that are necessary to make a proper diagnosis. Other physical signs or laboratory aids which may be helpful in the diagnosis of malaria did not occur with sufficient regularity to be entirely relied upon. Splenomegaly occurred in less than half the cases; the temperature curve is not characteristic; monocytosis was found in only about 1 out of every 6 cases; and other laboratory findings are not exclusive of a great many diseases.

It has already been stated, but it may be repeated with benefit, that any acute illness or unexplained clinical syndrome in a known addict or in an

FIGURE 3—Temperature Charts—Falciparum Malaria in Drug Addicts

CHART 1—Fatal Case—Quotidian Type of Fever
CHART 2—Fatal Case—Irregular Type of Fever
CHART 3—Recovery—Double Peaks
CHART 4—Recovery—Tertian Type of Cycle



individual showing evidence of heroin addiction warrants entertaining a provisional diagnosis of malignant malaria. A well stained blood smear should be carefully and repeatedly examined for plasmodia. If as a result of inexperience or improper facilities a diagnosis of malaria cannot be made the matter of quinine therapy must be considered. Unless other specific measures are indicated, and the condition of the patient fails to improve, the drug should be given. It cannot harm the patient and should not interfere with other diagnostic measures or steps to arrive at a correct diagnosis if this should not be malaria.

4. *Mortality:*

The disease, even after early diagnosis and intensive therapy, is a serious one. The table of mortality (Table 2) bears this out.

In the last few months of 1933, when the epidemic first was recognized in New York, most of the patients died. In some instances the condition was not recognized and in others, when the diagnosis was made, the disease had progressed to such a stage that treatment was of no avail.

In more recent years, the mortality experience in the cases observed on the Psychiatric Division is somewhat higher, probably due to the fact that

many of the patients seen on that service entered the hospital in the well advanced cerebral form of the disease.

SUMMARY, CONCLUSIONS AND SUGGESTIONS

1. New York City is an endemic area for the occurrence of falciparum malaria. The disease occurs almost exclusively among heroin addicts who practise the common use of hypodermic syringes. Infection is direct from man to man.

2. The parasite is *Plasmodium falciparum* and after 5 years of asexual transmission from man to man, it is still capable of infecting anopheline mosquitoes.

3. Clinically and pathologically the disease manifests all the characteristics of falciparum malaria as it occurs in the tropics, including various cerebral, intestinal, and hemoglubinuric syndromes.

4. The outstanding diagnostic feature is the history or evidence of drug addiction. On this evidence obscure syndromes in drug addicts warrant specific therapy.

5. Early diagnosis and intensive therapy are still followed by high mortality rate.

6. A thorough mosquito survey and a survey for the incidence of malarial infection in drug addicts in the New York area should be carried out.

7. Drug addicts recovered from malaria should be under the legal jurisdiction of the city department of health.

8. All available contacts with drug addicts should be explored and latent or asymptomatic carriers treated.

9. Treatment should include the use of an effective gametocidal drug.

10. There is local *Anopheles quadrimaculatus* production in the New York City area.

11. The possibility of an epidemic involving the healthy population must be borne in mind.

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Voluntary Agencies

I HAVE sometimes heard the fear expressed that the National Health Program would do away with the need for the voluntary agencies. Nothing could be further from the facts. The implications of the National Health Program are that more responsibilities, more work, and for many years to come an intensification of service, is the lot of the voluntary agency. We shall need all of our facilities, public and private, if the program is to meet its objectives. —Paul V. McNutt, Federal Security Administrator, in address before the National Health Council, New York, February 15, 1940.

Epidemiology of Anthrax in North Dakota*

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IN spite of knowledge developed by classical studies, cases of human anthrax continue to occur in the United States. Because of relative rarity and high fatality rate they receive widespread attention in the press and occasion considerable anxiety to the affected locality. That the menace, though not great, is still none the less real, would appear from collected information [4, 5, 6, 10] and from recent experience in North Dakota.

In the United States human anthrax has been considered primarily an industrial disease. It has been most frequently contracted from handling infected animals, skins or hair. Smyth [3] in a recent study of the sources of infection in 724 cases of human anthrax between 1919 and 1927, showed that the largest number occurred in the tanning industry, followed by the wool industry, cattle, shaving brushes, hair, and fur.

The number of human cases of anthrax reported to the U. S. Public Health Service from 1920 to 1938, inclusive, was 1,749.[2] The number of deaths attributed to this cause by the Bureau of the Census from 1920 to 1937, inclusive, is 391 (see Table 1). The indicated fatality rate based upon these reported cases and deaths is approximately 24 per cent. While there seems to have been some decrease in mortality during recent years, there has been little change in reported morbidity since 1927. The author agrees with Smyth,[4] however, that the available figures for this disease are subject to a large error both on the side of completeness of reporting and of accuracy of diagnosis.

TABLE 1

Anthrax in Man

Number of Cases of Anthrax in Man and Deaths from the Same Disease Reported in the United States for the Years 1920 to 1939

Year	Cases	Deaths
1920	134	36
1921	79	43
1922	89	42
1923	147	22
1924	197	27
1925	114	21
1926	139	17
1927	78	19
1928	90	18
1929	84	20
1930	91	23
1931	71	21
1932	58	24
1933	51	19
1934	68	10
1935	63	9
1936	77	17
1937	65	3
1938	54	..
Total	1,749	391

Since 1928 there have been reported to the North Dakota State Department of Health 5 human cases with 2 deaths.

* Read before the Epidemiology Section of the American Public Health Association at the Sixty-eighth Annual Meeting in Pittsburgh, Pa., October 20, 1939.

The only available information on the first of these was obtained from a death certificate, dated August 7, 1928. It showed that the infected person was a male, age 68 years, a farmer residing in Neche, Pembina County. The patient was first seen by a physician one day before death. Laboratory confirmation of the diagnosis was not obtained and no further information was available.

The other 4 cases have occurred during the past 2 years and upon them more extensive information is available. One of these belongs to the type arising from contact with infected animal brushes. The other 3 were in farmers and apparently due to direct contact with infected animals.

CASE 2

This case, occurring in August, 1938, proved to be especially interesting because of the source of infection. The patient was referred to the State Department for diagnosis because of a suspicion of anthrax by the attending physician. The patient had an indurated lesion approximately 5 cm. in diameter on the left side of the neck, somewhat similar in appearance to a furuncle. However, there was a central, black area of necrosis approximately 1 cm. in diameter and around the periphery there were several small vesicles. A large area of edema was noted around the pustule. A tentative, clinical diagnosis of anthrax was made by the epidemiologist. The patient stated that he first noticed what he called a small "pimple" on the left side of the neck on August 6. He observed an area of redness around this, and the "pimple" rapidly developed into what he thought was a "boil." Except for the swelling in the neck and a slight amount of pain, the only symptom noticed was headache. Although the first symptoms developed August 6, he first consulted a physician on August 13. Direct smears of material from the lesion showed organisms corresponding morphologically and tinctorially with the anthrax bacillus. The patient was removed to a hospital and given 100 cc. of anti-anthrax serum intravenously and 50 cc. more the following day. Except for a slight serum sickness, recovery was uneventful.

For further laboratory confirmation a blood sample had been taken for culture, and material had been obtained from the lesion for culture and guinea pig inoculation. In spite of the fact that these proved negative, we were convinced from the history, physical findings, and direct smear examination that this was a case of anthrax and that an investigation to determine the source of infection was indicated.

Epidemiological Investigation—The patient, R. B., a 35 year old male, was a transient harvest laborer who had come to North Dakota approximately 3 weeks before the onset of the disease. He stated that he had been working only with tractors and farm machinery and insisted that he had not been in close contact with cattle, sheep, or horses either healthy or sick; nor, to his knowledge, had he been in contact with any sick people. On further questioning, it was learned that he had purchased and used a new shaving brush approximately 6 days before the onset of symptoms. As this was within the generally accepted maximum incubation period of 7 days,[5] this lead was followed. The shaving brush was obtained from the farm home where he was employed. The bristles were divided into three portions, and a sample sent to each of the two state laboratories and to the National Institute of Health for bacteriological examination, which showed the presence of a pathogenic, sporulating aerobe, culturally and morphologically identical with *Bacillus anthracis* in 2 of the 3 samples examined.

Because of the possibility that the contamination of the shaving brush with *Bacillus anthracis* might have been the result of the patient's infection rather than the cause of it, it was necessary to obtain other unused brushes of the same kind for examination. The patient had purchased his brush at a local variety store. The type of brush could be identified by the imprint "Imperial, Sterilized, Japan 332." Four more brushes of the same type were obtained, and examined bacteriologically by the state laboratories and the National Institute of Health, with the result that anthrax spores were found in all 4. Another group of 4 brushes purchased at the same store *but not* bearing the same imprint were examined *without* isolation of *Bacillus anthracis*.

On August 23, 1938, a sample of the bristles of the patient's shaving brush was sent to the National Institute of Health for laboratory examination to determine whether or not *Bacillus anthracis* could be isolated. Because of the interstate implications, a summary of the preliminary epidemiological investigation suggesting that a shaving brush was the probable source of infection was forwarded to the U. S. Public Health Service on August 31, 1938. The final report including all the evidence available from the North Dakota laboratories was sent to the Surgeon General on December 28, 1938. The Interstate Sanitary District Office of the U. S. Public Health Service then followed down these brushes from the wholesale establishment to learn the source and distribution. The U. S. Public Health Service traced shipments of shaving brushes back to the importer. A report of the Surgeon General[6] stated that "more than 35,000 of these brushes received in four shipments from Japan since 1937 have been sold or distributed." Because of incomplete and missing records of the distributors and others concerned, it was impossible to locate all stocks of these brushes. The State Department of Health obtained from the U. S. Public Health Service a list of all North Dakota retail agents of the distributor and all remaining unsold stocks of this type of brush were obtained for condemnation. Through the coöperation of the press, the public was informed of the potential danger of these brushes and anyone possessing a brush of this type was urged to forward it to the State Department of Health or the local health officer. However, only 36 brushes have been returned, to date, in North Dakota.

Another report from the U. S. Public Health Service states:

> Several brushes, taken from the remainder of the importer's stock, were found to be contaminated with anthrax spores and a great variety of other bacteria when examined by both the National Institute of Health and the New York City Health Department. This finding suggests that this entire importation might have been infested with anthrax spores.
>
> The importation of these brushes was covered by a consular certificate as required by the Foreign Quarantine Regulations. These regulations require that shaving brushes from abroad be accompanied by a consular certificate stating that there is no anthrax present in the area and describing in detail the sterilization process used.
>
> On or about January 23, the Surgeon General requested a ban be placed upon the importation of shaving brushes from Japan.[7]

On March 16, 1939, the Quarantine Regulations of the United States were amended to require not only a consular certificate but also a certificate of bacteriological examination of shaving or lather brushes of foreign origin showing freedom from anthrax infestation.[8]

In connection with this case of anthrax it is interesting to note that the Wisconsin State Board of Health reports the same type of shaving brush as the probable source of infection in an anthrax death occurring in that state. To quote from this report:

After having recorded no death from anthrax in 10 years, Wisconsin recorded such a death in July, 1938, the victim a Marinette County man. Laboratory tests bore out the shrewd diagnosis made by the family physician. When the current situation was publicized in January, the Marinette man's widow read of it and a few days later communicated to the State Board of Health that she had remembered that her husband had purchased a shaving brush shortly before his death. The brush being still in the household, she examined it and found the fatal imprint, "Imperial, Sterilized, Japan, 332," upon the handle.[9]

It is interesting to note, however, that from a shipment of 35,000 brushes, a considerable proportion of which were contaminated with anthrax spores, only 2 human infections have been recognized, reported, and traced to this source by epidemiological investigation.

Smyth[4] reports 69 cases of human anthrax in which the shaving brush was the source of infection, during the period 1919–1938. Six cases of this group occurred during the period 1934–1938. Smyth in his report points out that "shaving brush cases, formerly so prevalent at about the time of the World War, have been greatly reduced in number, but they still keep cropping up, and when they do, they have a fatality rate of from 50 to 66 per cent." In spite of the fact that Hull[1] in 1930, concluded: "The shaving brush has ceased to be a hazard," the thought that 6 cases of this type have been reported in the last 5 years, with a high fatality rate, and that there are undoubtedly a number of anthrax infested brushes on the market now, should make one hesitate to ignore the shaving brush as a potential source of infection.

CASE 3

This was the first reported case of anthrax on the records of the State Department of Health and occurred in a resident farmer in 1937. The patient became ill on August 15 when he complained of malaise, fever, and pain in the left arm and hand. The physician who first examined him did not make a diagnosis. Three days later the symptoms became more severe, and the patient was referred to another physician. Examination revealed two lesions on the left hand and arm which were typical of anthrax, clinically, and the diagnosis was confirmed by direct smear examination. Guinea pig inoculation was not done. This patient was given serum, and made an uneventful recovery. It was found that the patient had skinned three cows which had died suddenly on his farm between August 6 and August 13. Although he did not suspect the cause of sickness in his cattle, post-mortem examination of the second animal he skinned showed the cause of death to be anthrax.

It was noted that there were no known cases of anthrax in cattle on this or any neighboring farm, and no new cattle had been purchased or brought into the community for a period of 15 months. The records of the State Livestock Sanitary Board showed that the only known anthrax in cattle in this region occurred 6 years previously on a farm approximately 28 miles distant.

CASES 4 AND 5

These were cases of agricultural anthrax and are considered together because they occurred at the same time and had the same source of infection.

The first information on Case 4 was received from the State Veterinarian who informed the epidemiologist that a report had just been received of the death of a group of anthrax infected cattle and that it was rumored that one of the owners of the cattle was sick. A field investigation showed that the patient, a male farmer age 24, had a clinically typical anthrax lesion on the right elbow. Eleven cattle belong-

ing to this farmer had died within 1 week, but because he believed death was caused by "poison weed," he removed the hides before disposing of the carcasses. His anthrax lesion appeared 3 days after handling these cattle. He was given serum and recovered after a stormy convalescence.

Three other persons who helped skin these cattle were examined at the time of investigation of Case 4, and Case 5 was discovered in this group. This person said he was not ill, but it was noted that the fourth finger of his left hand was bandaged. This, he explained, was "sore from a thistle thorn infection." However, it was found that the lesion was an anthrax pustule, and the patient had a temperature of 101.4° F. In spite of his protestations that he was not sick, he was hospitalized and given serum although given intensive therapy. This case terminated fatally 2 days later. Direct smear examination confirmed the clinical impression but a culture from the lesion, blood culture, and guinea pig inoculation were negative. The second day the patient developed an anthrax meningitis, and the spinal fluid showed a sporulating aerobe with the morphological, cultural, and pathogenic characteristics of the anthrax bacillus.

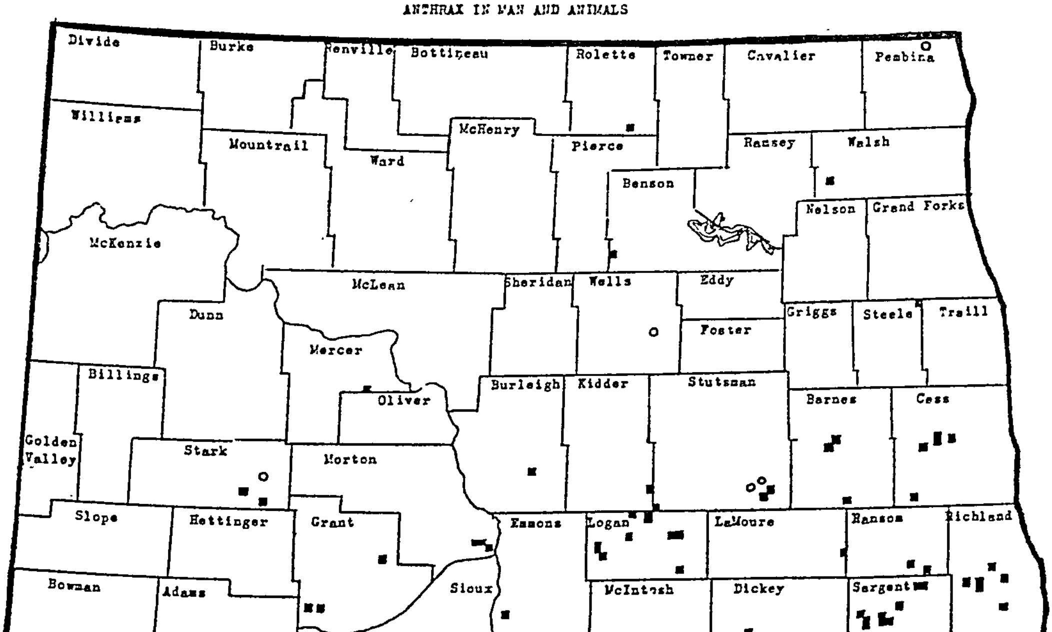
In these cases, as in Case 3, there had been no *reported* anthrax infection in cattle in the vicinity. The only other cases known in this region occurred in 1934 on a farm approximately 36 miles distant.

The implications as to human risk of these 3 cases traceable to direct contact with cattle locally produced in North Dakota depend upon the frequency and distribution of anthrax in the livestock of the state.

According to the records of the State Livestock Sanitary Board, there have been 63 instances of animal infection since 1923. Their geographic location in relation to the human cases is roughly shown in the accompanying map. It seems highly probable that a con-

North Dakota State Department of Health
Division of Preventable Diseases

ANTHRAX IN MAN AND ANIMALS



Legend:
○ Geographical Distribution of Human Anthrax Cases - 1928-1939.
■ Anthrax in Animals in North Dakota - 1923-1939.

siderable number of cases of anthrax in animals may have escaped recognition and that the picture here presented may tell only part of the story. It remains to be determined whether there are in North Dakota certain farms and localities where the pasturage and soil are contaminated with spores, giving rise to occasional infection in an animal or herd *grazing* over these areas, or whether these are traceable to contaminated feed stuffs *imported* into the state from other parts of the country. Pending more exact information regarding the source and contact of animal anthrax, recommendation of the widespread use of the more recently developed immunizing procedures for cattle hardly seems to be warranted. The public should, however, be fully acquainted with the known facts.

SUMMARY

During the past 2 years, 4 cases of human anthrax have been recognized and reported in North Dakota. One was traced to the bristles of a shaving brush imported from Japan. The other 3 were in farmers who had direct contact with locally produced infected animals.

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Hospital Morbidity Reporting*

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IF the goal of statistics of morbidity is the reporting of every case of sickness, just as the goal of statistics of mortality is the reporting of every death, we are placing before ourselves a very difficult task in the United States. It may be worth while to review the essential characteristics of reporting upon mortality and to ask in what respects the problems of reporting upon morbidity are the same, in what respects they differ.

First, there are the quantitative aspects. Mortality reporting provides a statement of the total volume of deaths in a given time and in a population of given size. It has been possible also to analyze that volume as it is affected by the related factors of age and sex, and to arrive, for comparative purposes, at the method of the refined and the standardized death rate.

Second, there are qualitative aspects. Mortality reporting provides an analysis according to cause of death. For this purpose the adoption of the *International List of Causes of Death* [1] and the *Manual of Joint Causes of Death* [2] has been essential.

Third, there are procedural aspects. Mortality reporting has been developed through compulsory reporting by physicians, through placing responsibility for enforcement of the law and for original collection of reports of death upon state and local health departments, and finally through the leadership of a federal agency, the Division of Vital Statistics in the Bureau of the Census, which has set standards, has encouraged and educated reporting agencies, has collected reports on a national scale, and has published uniform mortality statistics. A skillful combination of legal authority to require reports, an appeal to public pride, and a pragmatic use of incomplete data through the device of the registration area have done much toward completion of our mortality statistics.

Considering, on the other hand, the problems of reporting every case of sickness, we are confronted immediately by the fact that even the simplest quantitative problem, the statement of the volume of morbidity, cannot be solved because of uncertainty as to the actual fact of sickness. At what level of knowledge is the fact to be established? By the patient's own belief in his illness? or by the physician's diagnosis? As a practical matter neither of these will insure a report on the total volume of morbidity, since an unknown proportion of patients actually ill are unattended by a physician and since, on the other hand, an unknown proportion of persons who believe them-

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* Read before the Vital Statistics Section of the American Public Health Association at the Sixty-eighth Annual Meeting in Pittsburgh, Pa., October 19, 1939.

selves ill are actually well. Moreover, the check on accuracy provided by postmortem examinations is not available for morbidity statistics.

A second quantitative problem in the reporting of morbidity is determination of the degree of sickness to be considered. Is a non-disabling illness, such as a slight cold, to be counted? If not, what standards can be established for the reporting of illness?

A third quantitative problem is the question of related factors. Although the related factors of age and sex have been discovered in mortality statistics to affect profoundly any comparative statements of volume, the related factors for morbidity reporting are probably far more complicated and are still subject to considerable exploration.

In its qualitative aspects the reporting of diagnoses, or the causes of morbidity, presents some of the same technical problems as mortality reporting, but the classification of diagnoses is even more difficult than the classification of causes of death because of the higher degree of variability in the data. This is the most important aspect of the problem of hospital morbidity reporting and will be discussed later.

The procedural problems of reporting upon morbidity are no more difficult than those of reporting upon mortality except that the volume is greater. If there were sufficient public interest, physicians could be required to report; state and local agencies could be designated to enforce the law and to collect reports; a federal agency could set standards, collect reports, and publish results. A beginning already has been made in this area in the compulsory reporting of communicable diseases and certain other conditions. The most important procedural problem is to secure agreement upon a standard classification of diagnoses and to develop a technic for the statistical handling of cases with two or more diagnoses.

So far we have no plans for comprehensive reporting upon morbidity. In the absence of such plans the reporting of morbidity by hospitals may be considered as a controlled and experimental area similar to that of the reporting of communicable diseases, within which some of the technics of complete morbidity reporting may be developed. But just as the reporting of communicable diseases is in itself important, so is hospital morbidity reporting important, for it serves to establish the fact of sickness through exclusion of doubtful or unimportant cases and it provides information hitherto not available on the incidence of disease that is of unquestionable value in the distribution of hospitals and in their administration.

The crude volume of hospital morbidity is already known for many cities in the United States. In New York State the number of admissions to all public and voluntary hospitals in the state, the number of discharges, and the number of patient days are reported annually to state departments.[3] These morbidity data, however, lack the refinement of analysis by age, sex, and diagnosis. Moreover, until the number of readmissions for the same condition is eliminated the total number of admissions or discharges represents an overstatement of the volume of morbidity.

The procedure already established for this quantitative hospital morbidity reporting, however, could be extended easily in New York State to include the qualitative aspects of diagnosis, age, sex, and other important factors by requiring from each hospital an individual report upon the discharge of each patient. There is already considerable precedent and considerable experience in New York State in the collection of such reports in the fields of the foster care of children, the care of adults in public homes, and in the administration of old-age assistance, aid to the blind,

and aid to dependent children under the Social Security Act. In some of these fields the State Department of Social Welfare collects reports indirectly through the medium of county departments of welfare. In the hospital field, however, there is so far no local governmental unit designated to collect reports, and each hospital reports directly to the state.

In addition to state reports there is also precedent in New York City for reports to a local central collection agency. Hospitals that are members of the United Hospital Fund report their volume of sickness to that Fund, all voluntary hospitals receiving public charges report their total volume to the Finance Department of the city government, and all municipal hospitals (21 in number) report to the Department of Hospitals of the City of New York. These municipal hospitals report not only upon volume but also upon diagnosis. Although they are no longer published for general use, statistics upon the incidence of disease in public hospitals are available for administrative use by the Department of Hospitals.

While the procedure for collecting uniform hospital morbidity reports presents no important difficulties on the side of organization and mechanical handling, there are still difficult scientific problems to be met. Chief among these is the need for a standard classification of diagnoses for practical statistical use. Second, there is to be devised a uniform procedure for reporting, classifying, and tabulating cases with two or more diagnoses since it seems desirable not only to know the incidence of different diseases but to have a count of patients classified according to a primary or a selected diagnosis—a count unduplicated by secondary diagnoses.

The essential framework for reporting upon morbidity by hospitals may be summarized as follows:

In each hospital

1. The physician responsible for the case must enter the diagnosis on the patient's record.

2. The standard nomenclature of disease must be used for this purpose.

3. An informed and experienced medical record clerk, who has access to the physician in cases of doubt must prepare from the patient's hospital record a report on each discharged case including a statement of diagnosis. This report should include:

   a. A standard list of items about each case, such as age, sex, diagnosis, etc.

   b. An additional list of questions for selected diagnoses, such as operative procedure in surgical cases, use of radiotherapy in cancer, etc.

4. This individual report on each discharge must be forwarded to the central collecting office—city, county, state, or federal. This may be done at weekly or monthly intervals, frequently enough for the doubtful cases to be discussed between the physician and the record clerk and frequently enough to maintain an even flow of work in the central office.

In the central collecting and tabulating agency (state or local)

5. Diagnoses must be coded by informed and experienced statistical clerks.

6. A standard classified list of diagnoses for coding and classification must be used.

7. Reports of complications and secondary diagnoses must be tabulated in a standardized way.

In a federal or other agency established to set standards

8. A standard classification of diagnoses must be published.

9. Instructions for handling cases with more than one diagnosis and for securing unduplicated count of cases according to major diagnosis must be issued.

10. A standard set of tables must be constructed, including variations in correlations for particular diagnoses, such as cancer, to bring out the most important factors.

In this framework there are only two difficult problems since all of the others have been solved by the experience in mortality reporting and in the central reporting of social statistics, and since that experience is transferable. Two scientific problems remain: (1) agree-

ment upon a standard classified list of diagnoses, and (2) agreement upon procedure for handling cases with two or more diagnoses.

At least a first approximation to the solution of the problem of classifying the extremely complicated body of data presented by hospital diagnoses has been provided by the Welfare Council of New York City in *A Classified List of Diagnoses for Hospital Morbidity Reporting*,[4] the first publication of results of the Hospital Discharge Study.[5] This list is based on experience in classifying and tabulating reports upon 576,623 discharges from hospitals in New York City in 1933. Since the reasons for the classification are discussed in that publication, time will not be taken here to repeat them, except to remind you that the *Standard Classified Nomenclature of Disease*,[6] published in 1932 contains 10,000 or more separate items and therefore cannot be used for practical purposes as a stub to a statistical table. Moreover, the condensation of the *International List of Causes of Death* by the U. S. Bureau of the Census, which results in a list brief enough for statistical work, has been directed toward the classification of deaths, not toward the classification of morbid conditions in persons still alive. It is obvious that many causes of illness are not important as causes of death but may be highly important for hospital administration. The recently suggested list therefore follows the *Standard Classified Nomenclature of Disease* in terminology but reduces the list to 433 items for practical statistical use in hospital morbidity reporting, and correlates these with the *International List of Causes of Death*. The publication admits certain defects, particularly in the omission of a classification of cardiac conditions for which the hospital records were inadequate. Future experience will doubtless reveal other points at which the classification must be modified.

The second scientific problem, that of the statistical handling of cases with two or more diagnoses, has been attacked by the Hospital Discharge Study also, and at least tentative conclusions may be stated at this time.

The Hospital Discharge Study copied diagnoses that had been recorded by the hospitals during 1933 without any future statistical use in view. The *Standard Classified Nomenclature of Disease* was then in use in only 2 of the 113 hospitals, but even if the diagnoses had been stated in uniform terms there would have been certain situations that could not have been eliminated:

1. There were cases in which two or more diagnoses were entered in hospital records without any indication as to which was the reason for hospital stay, which was the primary diagnosis, which the complication, which was given treatment as an acute condition, which was perhaps ignored for the time being as a chronic state.
2. There were certain records in which the diagnostic notations were extremely numerous. Sometimes notations of mere symptoms were mingled with those of diagnoses.
3. There was another group of records in which the recording of secondary diagnoses, on the contrary, had been neglected.
4. Other records contained notations that can be explained only as a series of diagnostic guesses. The diagnosis finally settled upon, however, was given no special prominence.

The schedule originally devised in the Hospital Discharge Study for transcribing the hospital records actually provided space separately for "diagnosis" and for "complications," but it was impossible for the research staff to follow this schedule. The transcribers were not medically trained and it was necessary to impose the rule that the diagnosis must be copied exactly, faithfully, and completely. Thus, only when the hospital itself had made some distinction between diagnosis and complication or between primary and secondary diagnoses was it possible for the transcriber to turn in a completely satisfactory schedule.

The first authoritative examination of the schedules revealed an unexpected accumulation of diagnoses in certain schedules. There were not only schedules with 3 or 4 conditions but many with 5 or 6, and several with 7 to 10 or more diagnoses.

One arbitrarily chosen example will illustrate the situation as shown in the original schedules. There is the instance of the 22 month old boy who died in the hospital after a 421 day stay. The diagnosis on the discharge schedule reads as follows, word for word:

> "Malnutrition; rickets; impetigo contagiosa; Little's disease; cerebral infantile paralysis; gonococcal infection; conjunctivitis; acute rhinitis; acute bronchitis; acute otitis media; broncho-pneumonia; chronic cardiovascular disease; regular sinus rhythm; gastro-enteritis."

Our medical staff considers that the monstrosity of this so-called diagnosis is obvious. Two of the 14 "diagnoses" are different names for identical conditions (Little's disease and cerebral infantile paralysis). Several of the diagnoses are evidently superfluous. For example, the statement of an acute rhinitis or an acute bronchitis does not seem necessary when a broncho-pneumonia is reported. The statement of malnutrition is also superfluous, since a child with so many serious pathological conditions would probably be in a poor general condition. Moreover, this enumeration of "diagnoses" does not place emphasis on any of the conditions and does not give any indication of correlation between some of the recorded conditions.

The first step in the task of tabulating the discharge schedules was to reduce the number of "diagnoses," that is, to eliminate all superfluous diagnostic notations and to limit the number of diagnoses per case to a certain maximum that could be considered significant. This difficult process of reduction was placed in the hands of a group of persons with medical education and was guided by the following considerations:

1. Four diagnoses were established arbitrarily as an adequate maximum.
2. A certain number of diagnostic notations were eliminated by dropping a complicating condition that more or less regularly accompanies the major condition (examples are: cholecystitis accompanying cholelithiasis, concussion of brain accompanying fracture of skull, acute purulent otitis media accompanying acute mastoiditis, etc.). Or typically secondary conditions could be dropped regularly, such as secondary anemia, secondary hemorrhage, malnutrition, etc. Common cold was regularly dropped when associated with another disease.
3. A certain number of other diagnostic notations were eliminated by combining several manifestations of the same etiology under one unitary diagnosis—for instance, tabes dorsalis plus aneurysm under general syphilis, laryngitis plus rhinitis under common cold, etc.
4. In cases where these and similar rulings did not succeed in reducing the number of items sufficiently a further reduction was achieved by eliminating individual diagnostic notations that in the particular combination of diagnoses seemed of least importance. This decision as to preference for various elements of a combined diagnosis was made in accordance with the listing of the *Manual of Joint Causes of Death.*

The combination of all these procedures reduced the number of diagnoses on each schedule to a workable number, not exceeding 4 in any case. The final tabulation showed that in 78 per cent of the records a single diagnosis had resulted from this process, in 17 per cent 2 diagnoses had been retained, in 4 per cent 3, and in only 1 per cent of the cases were there 4 diagnoses that were both sufficiently important and sufficiently independent to be retained.

Critical examination of these figures immediately raises the question whether they reflect the true situation. This question must be answered in the negative. The reason is that numerous records did not contain any notation of additional diagnoses and it is certain that many noteworthy diagnoses remained unrecorded. A comparative

study of the records of different hospitals gives interesting documentary material indicating that different hospitals handled the notation of secondary diagnoses, apparently arbitrarily, in very different ways. For example, one hospital with 1,025 deliveries reported only 3 cases of toxemia of pregnancy, while another with 1,285 deliveries reported 103 cases. It is easy to understand that there was no uniform practice in reporting slight conditions such as laceration of the perineum, but it is hard to understand why the recording of a condition of such vital importance as toxemia of pregnancy was handled in such different ways.

In the Hospital Discharge Study it was impossible to supply the lacking information. To interview the attending physician after so long a time had elapsed would have been impossible. The cases were tabulated after careful scrutiny, but it must be admitted that the figures for the occurrence of cases with one, two, or more diagnoses are probably too low, and the total figures for the occurrence of certain diagnoses in the *Classified List of Diagnoses for Hospital Morbidity Reporting* must be likewise considered too low.

Two tabulations were necessary, one to supply data on the incidence of various diagnoses and the other to count patients once, according to the most important condition. The first of these, already published, tabulates every condition (after elimination of those beyond the fourth) regardless of the number of times the patient is counted. Thus there result more than 750,000 diagnoses for 576,623 discharges.

The second tabulation, not yet quite complete, is referred to as the "unduplicated count" and includes a patient only once, classifying him according to the condition that seemed most likely to be responsible for his hospital stay.

The choice of diagnoses for this unduplicated count of patients was based on the general idea that in each combination of acute and chronic conditions the acute must be considered as the element that is responsible for the particular hospital stay in question. The following preference list resulted from this principle: Delivery takes first place, followed by traumatic conditions, infectional hypertrophy of tonsils and adenoids, acute infectious diseases, etc.

Although it is inevitable that the practical application of such arbitrary rules results in certain inaccuracies, it can be assumed that in the majority of cases the decisions are correct. It must be remembered that the number of cases in which the rule was to be applied constituted only 22 per cent of the cases. Moreover, the first three items on the preference list—deliveries, newborns, and tonsils—accounted for 180,000 of the half million discharges. Therefore, it is probable that the cause of hospital stay is fairly obvious in a large proportion of the total.

For the success of future hospital morbidity reporting, however, the use of such arbitrary rules should be rendered unnecessary through the construction of a schedule with special rubrics for the various kinds of additional conditions. The very presence on the reporting schedule of precisely designed rubrics may prevent significant diagnoses from being omitted and qualitatively different categories of diagnoses from being confused. Such a schedule presumes coöperation between the attending physician and the medical record clerk since the adequacy of the report will be limited by the physician's original record of the case and the clerk's ability to transcribe it on the schedule.

The use of an elaborated schedule also requires careful definition and delimitation of the several categories of diagnoses that are to be reported. Particular emphasis must be given to the "major diagnosis," which may be de-

fined as the condition responsible for the admission to and treatment in the hospital and which appears, from experience in the Hospital Discharge Study, to be the only diagnostic information that can be used when an unduplicated count is intended.

To the objection that general knowledge about morbidity will be unduly limited if the tabulation is limited to the cause of hospital admission, let me remind you that a second tabulation may be made in which all reported diagnoses are included. But even for this second tabulation, differentiation in diagnoses as to quality is important. It is suggested from experience in the Hospital Discharge Study that additional diagnoses be differentiated in three groups, namely, (1) complications, (2) accessory conditions, and (3) chronic states. Detailed definitions of these different categories of diagnoses will be suggested in the final report of the study.

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1. *Fifth Revision of the International List of Causes of Death,* Vital Statistics—Special Reports, Bureau of the Census, U. S. Department of Commerce, Washington, D. C. July 18, 1939.

2. *Manual of Joint Causes of Death,* Bureau of the Census, U. S. Department of Commerce, Washington, D. C., 1925.

3. Reports by public and voluntary general and special hospitals, except state hospitals for mental disease, are made to the New York State Department of Social Welfare. Reports of state hospitals for mental disease are made to the State Department of Mental Hygiene.

4. *A Classified List of Diagnoses for Hospital Morbidity Reporting,* Research Bureau, Welfare Council of New York City, May, 1939.

5. The Hospital Discharge Study was undertaken in 1933 by the Research Bureau of the Welfare Council as a work project sponsored by the city government and financed by the Civil Works Administration. It was later continued as a project under the city and state work relief authorities and is being completed as Project 665-97-3-54 of the Work Projects Administration of the Federal Works Agency. The work was planned in coöperation with an advisory committee, including Dr. George Baehr, Dr. Ernst P. Boas, Dr. Charles F. Bolduan, Dr. Eleanor Conover, Dr. E. H. L. Corwin, Dr. Neva R. Deardorff, Godias J. Drolet, Dr. Haven Emerson, Dr. Ralph G. Hurlin, Dr. Caroline Martin, and Homer Wickenden, and was directed until September, 1938, by Dr. Neva R. Deardorff. Since that date the study has been continued under the supervision of the first named author.

6. *A Standard Classified Nomenclature of Disease* (2nd ed.), American Medical Association, Chicago, 1937.

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MEDICINE AND PUBLIC HEALTH BUILDING AT NEW YORK WORLD'S FAIR

UNDER the direction of the American Museum of Health, the Medicine and Public Health Building will continue for the 1940 season at the New York World's Fair when it opens on May 11. Dr. Louis I. Dublin, Acting Chairman of the Board of Directors of the Museum, has announced that negotiations have been completed for the operation of the building by the Museum. This leadership assumes the maintenance of the high standards of scientific authenticity and the freedom from commercial exploitation which characterized the exhibits in this building last year. That such an idealistic program met with popular approval is attested by the fact that over 7,500,000 visitors were clocked entering the Medicine and Public Health Building last season. That the plan was equally successful in winning the approval of the commercial and non-commercial organizations, whose sponsorship of exhibits made possible the presentation, is apparent from the enthusiastic assurances of a majority of these groups that they will participate in the 1940 exhibition.

The unprecedented success of this experiment in public health education gives renewed courage to all educators, demonstrating as it does the desire of the public for knowledge. In competition with lavish displays and elaborate extravaganzas of the country's largest industries, these purely educational exhibits attracted one out of every three visitors to the World's Fair.

Many phases of activities in the public health field were dramatized for the lay public, introducing for the first time to many visitors methods in the control of communicable diseases, the necessity for milk and food control and an especially interesting development in a new field of public welfare—housing for health developed under the direction of the Association's committee on The Hygiene of Housing.

"Your Health Department Protects Your Family," the exhibit sponsored by the American Public Health Association, provided the public with facts about the protectors of their health and welfare, and proved to be a source of help and inspiration to health workers from all parts of the United States and Canada.

Demonstrations in the control of communicable diseases in the home which were a feature of this exhibit made it one of the most popular attractions in the hall. During one week nearly 18,000 people attended these demonstrations. They were presented through the coöperation of the Visual Education Project of the National Youth Administration.

With the experience of last season as a guide, plans for the further improvement of the exhibit in 1940 have been made. Those interested in public health, in education, in social service work, in medicine, dentistry, and all their allied fields, may confidently expect again to find the Medicine and Public Health Building at the New York World's Fair in 1940 a brilliant demonstration of mass health education.

DENTAL HEALTH

DENTAL health, entirely apart from dentistry as a profession, is coming to be recognized as worthy of consideration from every standpoint. Recently off the press is a *Public Health Bulletin* [1] giving a very short history of the development of this line of work which began only in 1918 in this country, and a list of the state departments of health which have dental health organizations. There have been many independent investigations, books written on the subject, courses introduced into some medical schools,[2] and in our own Association, the development of a dental health group which has given us valuable aid.

Virginia was first (in 1916) to appoint a dentist on the State Board of Health. Dental health work was initiated in 1918 by the State Board of Health of North Carolina. Allotments under the Social Security Act, in 1935, led to greatly increased activity, so that by July, 1938, there were 35 state departments of health with dental services.

On this general subject another most interesting report comes to us [3] which, as far as it goes, upsets to a certain extent ideas which have become rather firmly implanted.

The term "socio-economic" has been applied to factors which unquestionably influence public health in many ways, and it is correctly pointed out that practical programs based on correct appreciation of these factors have done much for the reduction of morbidity as well as mortality from certain diseases.

To determine the influence of community socio-economic conditions on the incidence of dental caries, a study has been made of some 200,000 children in 40 urban communities in New Jersey living under fairly representative conditions. While some of the basic data are not entirely satisfactory, many are sufficiently precise for the purpose of analysis and evaluation. A rather ponderous term, "odontothanatotic" has been coined for use in this connection, the odonothanatotic rate being the number of permanent teeth extracted and indicated for extraction per 100 children.

The conclusion is reached that the care of the teeth as indicated by fillings in permanent teeth is highly but inversely correlated with the deaths and extractions of teeth, hence the odontothanatotic rate is a rough measure of the relative amount of dental care received by children. Those with low odontothanatotic rates are characterized as a rule by relatively high levels of dental care and, conversely, while a high odontothanatotic rate means a low filled tooth rate.

The general conclusion of this extensive study which is, however, regarded as preliminary, is that the economic status of the community bears little relationship to the tendency of the children to suffer from caries in the permanent teeth, but there is an intimate relationship between economic status, the volume of dental care, and the total number of permanent teeth extracted or indicated for extraction. However, the number of permanent teeth extracted or indicated for extraction, which is a rough measure of the level of dental care, is not a precise measure of efficacy or volume of such care.

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TYPHUS AND ROCKY MOUNTAIN SPOTTED FEVER IN THE EASTERN UNITED STATES

NOT so long ago, when one thought of typhus in this country he had in mind Brill's Disease as found rarely, and then in only a few of the larger cities. At about the same time Rocky Mountain spotted fever was considered as being confined to Montana and perhaps to the neighboring states. In the light of the work of Goldberger, Maxcy, and others, typhus began to be recognized as an important factor in morbidity in the southeastern states. It was the occurrence of this so-called typhus (or Brill's Disease) in the eastern seaboard states that gave Dyer and his associates in the U. S. Public Health Service an opportunity to show that in eastern Maryland and Virginia the typhus cases could be divided into two categories—typhus fever, and a condition somewhat similar clinically. By a series of brilliant observations these workers proved the latter entity to be identical with, or, at most, a variant of the spotted fever of the Northwest, and it was designated " the eastern variety of Rocky Mountain spotted fever." Tabulated in parallel columns, the clinical differences between the two infections seem clear, and it would appear that a diagnosis could readily be made; actually, at the bedside the distinction is sometimes difficult, and laboratory tests ordinarily applicable may still leave the physician in doubt. Even in the field of histopathology differences in experimental animals are quantitative rather than qualitative. In some instances the distinction between the two clinical entities is to be made with certainty only in a laboratory equipped to carry out cross-immunity testing.

An important, but not very helpful, distinction may be made according to the outcome of the case; if fatal, spotted fever (eastern type) is probably the correct diagnosis, as typhus has a very low mortality as against a 20 to 25 per cent death rate for eastern Rocky Mountain spotted fever.

Both typhus and eastern Rocky Mountain spotted fever are now known to be widely distributed: whether they are only recently being recognized in larger geographic areas or whether there has in reality been an extension of the two infections cannot be decided with any degree of certainty. Both diseases have rather striking clinical features so that it is difficult to believe that either would long be overlooked if present in a community to any considerable extent.

Theoretically, both these infections are readily amenable to public health preventive measures, rats (and possibly other rodents) constituting the effective

reservoir of endemic typhus virus, and the common eastern tick being the host of Rocky Mountain spotted fever (eastern type). It is doubtful that preventive measures are often practicable; rat control means sustained expensive efforts that require the utmost in the way of community support, including effective enforcement of rodent control measures, particularly rat-proofing. Whether or not the menace is sufficient to warrant this on a scale that would probably be effective is doubtful. In spotted fever the problem, viewed from the public health aspect, is even more difficult; as is well known, the infection of man is almost invariably from ticks, but in this case there is no demonstrated mammalian host that could be named as the weakest link in a chain, and it goes without saying that we have no means of control of the tick population. In the eastern areas the incidence of spotted fever is hardly high enough to warrant the recommendation of widespread use of the vaccine that has been found useful in the western areas where the incidence of the disease is much higher.

There is of course always a possibility that endemic rat-flea transmitted typhus may become epidemic through louse human-to-human transference. Thus far it appears not to have occurred in the United States; probably it is not likely to occur on any dangerously large scale since infestation with human body lice seems to be rather infrequent at the present time. If an epidemic of louse-borne typhus threatened, doubtless it could readily be controlled through the utilization of the facilities of existing or improvised laundry and dry-cleaning plants.

HEALTH BROADCASTS

YOUNGEST among public health education media, the radio seems to us to be still in the trial and error stage of development. The coast-to-coast health broadcasts of the U.S.P.H.S. and of the A.M.A. have put the air lanes to impressive use. Smaller organizations attacking community health problems through local or regional air channels have contributed experimental programs as varied as the Philadelphia Health Council's Musicale with its pithy intermission commentary, the New York State Department's dramatic episodes in "Utopia," the Los Angeles maternity discussions in forum style, and the usual straightforward lecture.

By what technics can radio at once attract listeners and influence their behavior? To what extent can unsolicited aural information affect morbidity and mortality? Does a popularized broadcast, employing extrinsic motivations for learning, lose its educational force?

To the extent that we accept mass education as a factor in health promotion at all, we must assume aural learning from the loudspeaker to have an effect on the public health. How much of this effect is to rest with the advertisers of foods and proprietary medicines may depend in part upon the comparative listener-interest and persuasiveness of counterpropaganda by noncommercial health broadcasters.

Such efforts require constant repetition, easily accomplished on the weekly radio program. The listener receives the information effortlessly, without cost, and often without interruption of his household chores. Understood even by the illiterate, and penetrating homes that are never represented at community meetings, radio ought to be an invaluable health education tool in hands that know how to use it.

Apparently, what is needed is a form of showmanship that will attract audiences without overshadowing the scientific material presented. If extrinsic motivations for learning could serve not merely to sugar-coat the factual information but actually to point up the educational purposes of the broadcast, popularization itself would assist the educative processes.

Of recent health broadcasting efforts to combine audience-appeal with education, the Illinois State Department's 15 minute transcribed dramatic series is an interesting illustration.

To achieve state-wide coverage the broadcasts had to be so designed as to merit "sustaining" air time from a considerable number of independent radio stations, whether these were small or large, college-owned or commercial, within the borders of the state or just outside.

Released in the fall of 1938, the early productions were necessarily more or less experimental. From them has come a custom-built radio health education technic eminently successful in at least its first objective, that of gaining audiences in all parts of the state and at all social levels. Listener replies have come in from residents of prominent Chicago hotels as well as from farmers and from recipients of public assistance. The number of coöperating radio stations has grown from 18 to 30, increasing the total amount of time on the air weekly from 4½ to 7½ hours.

The dramatic formula of the programs is not complicated. The listener's attention is won at the opening of the playlet rather by an arresting plot situation than by a hackneyed or mentally unhygienic appeal to the fear of disease. Instead of objectively dramatizing isolated historical facts or illustrative therapeutic incidents the series presents vivid fiction in realistic contemporary settings so as to encourage listeners to identify with the protagonists. Hearing such a broadcast may well be a vital emotional experience because of which the clever solution will not easily be forgotten.

There are probably as many effective methods for adapting health education to the medium of radio as there are resourceful and ingenius health educators to do it. Health broadcasts all over the country are increasingly worthy of our best efforts and attention.

THE CRISIS IN HOUSING

UNDER the preliminary program of the PWA 51 "Better Housing" projects were built in 35 cities, and during the past two years 347 more projects have been initiated in 155 communities. Homes for 130,000 families now living in substandard dwellings will be provided under approximately $582,000,000 of loan contracts involved. This whole program is designed primarily to meet a health objective, interpreting health as we do today in terms of mental and social health, as well as in terms which include the sanitary and physiological relations of the physical environment. Furthermore, the health officer has a direct interest at stake. The selection of a site for a new housing project, the health values involved in construction and management, the selection of tenants on the basis of their habitation of substandard dwellings—all these are matters on which the health officer has or should have special competence. Furthermore, in the contract between the local housing authority and the USHA, it is provided that for every new dwelling unit built, one existing substandard dwelling unit in the city

must be demolished or rehabilitated. Every health officer knows that in the past the letter of the building code and the sanitary code could not be strongly and universally enforced without serious hardship on account of the lack of suitable dwellings to which tenants might be moved. The present housing program frees his hands at last and opens enormous possibilities for the elimination of the worst slum conditions.

In such cities as Baltimore, Chicago, Detroit, Memphis, New Haven, Newark, and Washington, the rôle played by the health department has been a particularly active one. In every city of the United States, however, whether a housing program is as yet in force or not, the health officer is interested in the continuation of this significant and promising program. It is of the utmost importance therefore that the present Congress should do what the last Congress failed to do—provide for the continuance of the program of the USHA and make adequate financial provision for its support. We have as yet only made a beginning in the vital task of housing reform carried on so successfully by such countries as England, Sweden, and Holland during the past quarter century.

BOOKS AND REPORTS

Books of Special Interest to Public Health Workers

MAZŸCK P. RAVENEL, M.D.

"Some books are to be tasted, others to be swallowed, and some few to be chewed and digested."—Bacon.

AGAIN we have gone over the books which have become available in the past year and selected those which we believe are of especial use to our readers interested in some branch of public health. As in the past, the basis of selection has been the reviews found chiefly in the *American Journal of Public Health,* the *Journal of the American Medical Association, The London Lancet,* and the *British Medical Journal.* The short comments are taken almost word for word from the reviews which are supposed to have been written by specialists and experts.

CHILD HYGIENE

During the past year, as always, children and their training have occupied a great deal of attention. Nevertheless, notable books on the subject are few. Among these are: *Babies Are Human Beings,* by C. Anderson Aldrich and Mary M. Aldrich, Macmillan, which is charmingly written and a book which physicians, nurses, and parents should read. *Your Baby and Child,* by M. C. Overton, Your Baby & Child Publishing Co., is a book for mothers, written in simple language, and answers all questions an intelligent mother might ask. The advice given is sound, following modern pediatric practice. *Nursery School Education,* by Josephine C. Foster and Marion L. Mattson, Appleton-Century, is based on years of personal experience and stands out as a source book—readable and suitable for lay as well as professional readers.

SOCIAL HYGIENE

This subject in one form or another has been much to the fore, but material on it has been confined chiefly to the venereal diseases. A valuable book, *The Social Work Year Book, 1939,* Fifth Issue, edited by Russell K. Kurze, Russell Sage Foundation, is necessary for the reference shelf—even more helpful than its very useful predecessors. *Medical Information for Social Workers,* by William M. Champion, Wood, is intended to enlighten beginners in social work though useful for all classes, with 9 chapters giving medical information in the medical specialties. The information has been gathered by the author of the book and 8 coworkers from the Faculty of Western Reserve University School of Medicine—an excellent presentation. *Population, Race, and Eugenics,* by Morris Siegel, published by the author, Hamilton, Ont., is a good discussion

for the lay reader by a physician, highly recommended for those who wish a sound yet simple exposition of the eugenic question.

INDUSTRIAL HYGIENE

The past few years have seen a marvelous expansion in new chemical products, almost all of which have practical application in industry so that many novel problems in the conduct of factories and the toxicology of the new products have come up, most of which have not yet found their way into permanent literature. The following books are of especial value: *Toxicity of Industrial Solvents: Summaries of Published Work,* compiled by Ethel Browning, Chemical Publishing Co. of New York, Inc., the first American edition of Report No. 80 of the Industrial Health Research Board—a valuable book, thorough, careful, and up-to-date, with a full bibliography and satisfactory index; *Silicosis and Asbestosis,* by various authors, edited by A. J. Lanza, Oxford University Press, a summary of our knowledge on silicosis and asbestosis, subjects which are recognized as most important in industrial hygiene, not only from the fundamental medical and engineering standpoints, but also from the economic and compensation point of view; *Carbon Monoxide Asphyxia,* by Cecil K. Drinker, Oxford University Press, a standard book by one who has devoted many years to the study of "the most widespread poison connected with human life and activity since the first discovery of fire."

MENTAL HYGIENE

Mental hygiene continues to advance and those interested in it have shown considerable activity. Among the excellent books are *Emotional Hygiene: The Art of Understanding,* by Camilla M. Anderson, Lippincott, one of the finer examples of popular treatment of mental hygiene, useful for public education in this important subject. *A Biological Approach to the Problem of Abnormal Behavior,* by Milton Harrington, Science Press Printing Co., an earnest effort to simplify to the average mind the mental processes by reducing them to a more concrete formula in physiological terms. *The Mental Hygiene Movement from the Philanthropic Standpoint,* Department of Philanthropic Information, Central Hanover Bank and Trust Company, is the best presentation of the mental hygiene movement for the layman that we know of, interestingly written, easily read, and free from the technical language which has puzzled and antagonized the layman. *Hereditary and Environmental Factors in the Causation of Manic-Depressive Psychoses and Dementia Praecox,* by Horatio M. Pollock, Benjamin Malzberg, and Raymond G. Fuller, State Hospitals Press, is readable and well planned. It should receive a warm reception from all interested in the progress of mental hygiene from its present status to one in which prevention of mental disease will take its proper place. *Man Against Himself,* by Karl A. Menninger, Harcourt, Brace, is an elaborate thesis by the brilliant author of *The Human Mind,* a best seller among the many lay treatises on the new psychologies, the upshot of which, based on Freud's concept of the death instinct posed against that of self preservation, is that man is his own worst enemy, an interesting hypothesis that stands or falls with the body of psychoanalytic doctrine. A monumental book, a review of which has been delayed, but which must be mentioned, is *Mental Health,* a publication of the American Association for the Advancement of Science, No. 9, being a symposium under 8 heads, which one can safely say cover practically every aspect.

HEALTH EDUCATION

We have included under this heading books which might have been placed in other categories, so our selections may be somewhat open to criticism. However, we call attention to books that should be read: *The School Health Program*, by C.-E. A. Winslow, McGraw-Hill, while a study made of conditions in New York, the experience in that state will be useful to others in working out similar problems elsewhere. *The Health of College Students*, by Harold S. Diehl and Charles E. Shepard, American Council on Education, is a report to the American Youth Commission of the American Council on Education, one of the first books of its kind calling attention to a much neglected subject, the health of college students. *Man and His Health*, Exposition Publications, Inc. (New York), is interesting in view of the prospect that the New York World's Fair will be continued in 1940, especially for those who look forward to visiting the exposition. *Man Against Microbe*, by Joseph W. Bigger, Macmillan, is an excellent book for the general public which should be in all libraries. Dr. Bigger, a professor at the University of Dublin, is the author of one of the most widely used textbooks on bacteriology.

NUTRITION

Some valuable textbooks on this subject have appeared, mostly new and revised editions. Valuable and unusual in its presentation to the public is *Foods: Production, Marketing, Consumption*, by Jean J. Stewart, Prentice-Hall. From production in the field to table etiquette, this book is replete with information of real value to health officers, physicians, nurses, dieticians, and food technologists, through education which tends to make life more interesting and efficient. Others which deserve mention are: *Nutrition*, by Margaret S. Chaney and Margaret Ahlborn, Houghton Mifflin, a well organized book the authors of which have overcome some of the failings of similar texts. It deserves a place in the reference libraries of doctors, nurses, dieticians, and other nutritionists. *Nutrition and Physical Degeneration: A Comparison of Primitive and Modern Diets and Their Effects*, by Weston A. Price, Hoeber, is an impressive book with an enormous amount of information on a much debated question. It can be read with advantage by all, even if the conclusions are not accepted. *The Newer Knowledge of Nutrition*, by E. V. McCollum, Elsa Orent-Keiles, and Harry G. Day, Macmillan, is a well known book brought up to date and will be welcomed by all. *Appertizing or The Art of Canning*, by A. W. Bitting, The Glass Packer, is the only book of its kind in the field giving the history, laws and practical application of canning. It is recommended without hesitation to all workers in the field of public health as a reliable reference.

LABORATORY

As usual, a great deal has been written concerning laboratory work, as the discoveries there made are fundamental to practical application. The following books may be mentioned: *A Fundamental Approach to Bacteriology*, by Courtland S. Mudge and Floyd R. Smith, J. W. Stacey, is a laboratory manual of unusual type which can be recommended for the purpose for which it was designed. *The Etiology of Trachoma*, by Louis A. Julianelle, Commonwealth Fund, is a book of great interest for those who are attempting to follow the expanding area of the virus infections. *A Manual of Veterinary Bacteriology*, by Raymond A. Kelser, Williams & Wilkins, is the outstanding book on veterinary bacteriology in this country. *Big Fleas*

Have Little Fleas, or Who's Who Among the Protozoa, by Robert Hegner, Williams & Wilkins, is a new type of text which holds the attention of laymen as well as scientists, containing lots of humor and much good sense. *Medical Entomology,* by William B. Herms, Macmillan, is a valuable reference for practising physicians, teachers, and students of medical entomology which should be found in every medical library. *Veterinary Helminthology and Entomology,* by H. O. Mönnig, Wood, can be thoroughly recommended as a working manual, especially for veterinarians. *Fundamentals of Dentistry in Medicine and Public Health,* by John Oppie McCall, Macmillan, is an enlargement of the " Primer " by the same author which was quite successful. It is useful, stated in clear language, containing a vast amount of important information, and can be recommended for both professional and lay readers. *Immunity Principles and Application in Medicine and Public Health,* by Hans Zinsser, John F. Enders, and LeRoy D. Fothergill (5th edition of *Resistance to Infectious Diseases*), Macmillan, is an excellent example of a critical treatise expanded to include chapters that correlate the principles revealed in the laboratories and their application to the clinic and public health.

ENGINEERING

An outstanding work is: *Modern Sewage Disposal,* edited by Langdon Pearse, Federation of Sewage Works Associations. This is a notable volume commemorating the 10th anniversary of the founding of the Federation of Sewage Works Associations, an excellent volume of reference for historical research in sanitary engineering, a text on sewage disposal, and a disposal plant operator's manual. *Water Supply Engineering,* by Harold E. Babbitt and James J. Doland, 3rd edition, McGraw-Hill, is brought up to date and fulfils the purpose for which it was intended adequately and well.

TEXTBOOKS

The year has brought out many excellent textbooks and a number of revisions, some of which have been so extensive as to be practically new. *Essentials of Medicine,* by Charles P. Emerson and Nellie Gates Brown, 13th edition, Lippincott, is intended especially for nurses and rewritten in accordance with suggestions in *Curriculum Guide for Schools of Nursing* of the National League of Nursing Education. *A General Textbook of Nursing,* by Evelyn C. Pearce, Dutton, is richly illustrated and an excellent reference book for schools of nursing and for nurses in general practice. *Military Preventive Medicine,* by George C. Dunham, *Army Medical Bulletin No. 23,* Medical Field Service School, is recommended unreservedly. *Nurses Handbook of Obstetrics,* by Louise Zabriskie, 5th edition, Lippincott. It is difficult to conceive of a more comprehensive or complete guide in this important field. *A Textbook of Orthopaedic Nursing,* by Evelyn C. Pearce, Faber and Faber, Ltd., is a standard book recommended not only to nurses in training but to social workers, physical trainers, and physiotherapists. *A Synopsis of Hygiene,* by Sir W. Wilson Jameson and G. S. Parkinson, 6th edition, J. & A. Churchill, Ltd., is a standard in England though there are some drawbacks (nomenclature, laws, etc.) as far as its usefulness in America goes. *A Textbook of Applied Microbiology and Pathology,* by Thurman Rice, 2nd edition, Macmillan, contains considerable additional material presented in interesting style, and will continue to hold its high place among texts of this type. *Pulmonary Tuberculosis in Adults and Children,* by James Alex-

ander Miller and Arvid Wallgren, Nelson, is an interesting and accurate presentation of the pathogenesis of tuberculosis, based on articles from *Nelson Loose-Leaf Medicine*. *The Biology of Bacteria: An Introduction to General Microbiology*, by Arthur T. Henrici, 2nd edition, Heath, is a valuable book brought up to date and increased in size by 22 pages. *A College Course in Hygiene*, by K. Frances Scott, Macmillan, is written by the Associate Professor of Hygiene at Smith College and the book is addressed to girls. It is excellent in every respect in the field for which it was designed. *Text-Book of Meat Hygiene: With Special Consideration of Antemortem and Postmortem Inspection of Food-Producing Animals*, by Richard Edelmann, Lea & Febiger, is one of the standard books of the world brought up to date and recommended without reservation. *Avian Tuberculosis Infections*, by William H. Feldman, Williams & Wilkins, is an excellent study of avian tuberculosis, the increasing importance of which is being recognized not only on account of transmission of the disease to swine, but also because it seems to interfere with the standard tuberculin test in cattle. *Manual of Public Health: Hygiene*, by J. R. Currie, Wood, is an excellent and precise volume with a very useful chapter on international health relations, explaining the spread of disease by modern transportation facilities and being so modern that there is a chapter on "Air Raid Precautions." *Reference Handbook for Nurses*, by Helen F. Hansen, Saunders, is a welcome and valuable aid to the public health nurse, with particular emphasis on the preventive aspects of nursing and of the opportunities which a nurse has as a health teacher.

VITAL STATISTICS

What has become of the vital statisticians? Not one book on this subject has been sent in to us for review nor have we been able to find the notice of one in the index of the *Journal of the American Medical Association* for 1939. We have failed also to find any book on the subject listed in the first volume of 1939 of *The Lancet* and the *British Medical Journal*. Consultation of the *Quarterly Cumulative Index* also has failed to give us any help.

HISTORY AND AUTOBIOGRAPHY

A very unusual book is *The Life of Chevalier Jackson: An Autobiography*, Macmillan. It is a human document of rare interest by the man who invented the means of saving hundreds of people, mostly children, from suffering and death. It deserves a place in all private and public libraries, medical and lay. *William B. Wherry—Bacteriologist*, by Martin Fischer, Thomas, is a labor of love telling the story of one who is noted for his achievements and loved for his personal qualities. The author has rendered a service in making this history available to the wide circle of Dr. Wherry's admirers and friends. *Sir Thomas Roddick*, by H. E. MacDermot, Macmillan Company of Canada, is the story of one of the outstanding figures in the medical life of Canada who taught hygiene in the Faculty of Medicine at McGill University. *Fighting for Life*, by S. Josephine Baker, Macmillan, an interesting autobiography of a pioneer, while marred by some inaccuracies, is well worth while in spite of them. *Medicine in Modern Society*, by David Riesman, Princeton University Press, is a sane and thoughtful book, the sort of work which should be made a part of the training of all well educated citizens. *The History of Bacteriology*, by William Bulloch, Oxford University Press, is easily the best work in this much neglected field. It is founded on

the Heath Clark Lectures for 1937, and should be required reading for all students of bacteriology. *Lillian Wald, Neighbor and Crusader,* by R. L. Duffus, Macmillan, is a picture of the great personality who was founder of the Henry Street Settlement. *The Story of Surgery,* by Harvey Graham, with a foreword by Oliver St. John Gogarty, Doubleday, Doran, is an unusually interesting book which gives much history with an abundance of human nature, humor, and philosophy.

GENERAL

Under this heading we place a number of books which could well go under other classifications. It is often hard to classify rigidly. *Sulphanilamide Therapy of Bacterial Infections,* by Ralph R. Mellon, Paul Gross, and Frank B. Cooper, Thomas, is an excellent review of earlier literature and the chemistry and pharmacology of the sulfanilamide compounds. *Gould's Pocket Pronouncing Medical Dictionary,* by George M. Gould, 11th edition revised by C. V. Brownlow, Blakiston, is a book the usefulness of which has been long established and the revision well done. *Sanitization of the Drinking Glass:* Part One, Methods and Procedures, by Jack G. Baker; Part Two, Practical Control, by Raymond V. Stone, National Association of Sanitarians, Inc. (Los Angeles), is a concise, comprehensive and dependable guide for health officers and sanitary inspectors. It can be recommended without qualification to all interested in this important movement. *Landmarks in Medicine,* Laity Lectures of the New York Academy of Medicine, Introduction by James Alexander Miller, Appleton-Century, is largely historical with application to present-day problems. It ranks among the best of this series. *Classic Descriptions of Disease,* by Ralph H. Major, Thomas, is a necessary book for all medical libraries and recommended for all others and is a mine of information on the history of medicine. *Health at Fifty,* edited by William H. Robey, Harvard University Press, is a useful and authentic book deserving a place in every public library. The title is somewhat misleading. Since health at the age of 50 implies the best care all during childhood and adolescence, these lectures, sponsored by Harvard University, are devoted to that early period of life. *The Anaerobic Bacteria and Their Activities in Nature and Disease: A Subject Bibliography,* by Elizabeth McCoy and L. S. McClung, University of California Press, is a monumental subject bibliography which has been praised everywhere. *Medical Vocabulary and Phrases: English, German, French, Italian, Spanish,* by Joseph S. F. Marie, Blakiston, is more useful in writing and preparing papers than for translation, since the rendition is from English into the other languages. *Alcohol: One Man's Meat,* by Edward A. Strecker and Francis T. Chambers, Macmillan, is an instructive, scientific and practically useful interpretation and evaluation of the why's and wherefore's of drinking and of the psychiatric approach to its management and control. Education for temperance is the ultimate, rational answer. *The Canned Food Reference Manual,* American Can Company, is a striking example of enlightened advertising, well documented and illustrated, and containing a wealth of useful information. *Health Officers' Manual,* by J. G. Geiger, Saunders, is a convenient summary of the service of one of the best health-administered cities, which lay groups of teachers and social or welfare workers on the west coast will find useful. *Community Health Organization,* Ira V. Hiscock, 3rd edition, Commonwealth Fund, is a thoroughly revised and up to the minute edition of a book which gained the front rank

from the beginning. It will be welcomed by all of those who work in the field of public health. *Your City*, by E. L. Thorndike, Harcourt, Brace, is a rating of 310 of the larger cities in the United States with standards for appraisal, and contains a great deal of valuable advice for those who would improve their city. *The Administration of High School Athletics*, by Charles E. Forsythe, Prentice-Hall, contains much valuable information for all, who either from the health viewpoint or that of education are concerned in the administration of secondary schools. The text was badly needed in that field. *Public Health Law*, by James A Tobey, Commonwealth Fund, is entirely rewritten and expanded, a "must" book for all engaged in public health whether administrator, educator, lawyer, or sanitary officer. It discusses the powers and duties of health departments, liability, legislation, and law enforcement. *Oh, Doctor! My Feet!*, by Dudley J. Morton, Appleton-Century, is on a subject which interests everybody and is more important than many realize. This book is a prophylactic against much lay advertising, and can be read with profit by physicians as well as laymen. *Marihuana: America's New Drug Problem*, by Robert P. Walton, Lippincott, is an authoritative discussion of this plant about which there is still much uncertainly as well as ignorance. It is unquestionably a danger, particularly to our youth, and this is a discussion of the facts and methods of control.

Much consideration has been given to this selection, and we trust it will be of real value. It must be remembered that further information can be obtained from our Book Service Department in the office in New York. We are always glad to respond to inquiries concerning books in general as well as those designed for special interests and professions.

A Mirror for Surgeons: Selected Readings in Surgery—*By Sir D'Arcy Power. Boston: Little, Brown & Co.*, 1939. 230 pp. Price, $2.00.

This delightful book of selected readings by great surgeons of the past has biographies of 22 men who have contributed to the advancement of surgery. Only one Frenchman, Ambroise Paré, is mentioned, and three Americans.

As far as the selection of English surgeons goes, there is no one more fitted to do this than the author, owing to his long association as Honorary Librarian of the Royal College of Surgeons and his literary work in revising and editing several monumental works and his biographies of surgeons in the *Dictionary of National Biography*. He also wrote the *Life of William Harvey*, and is now the Dean of British surgeons.

No fault can be found with the selection he has made of American surgeons as far as they go, though we might wish to see a few more names added; for example, that of McDowell. The sketch of Marion Sims is deficient and also confusing as to his education and moves. He was a student in the Medical College of the State of South Carolina for a year and got his degree finally from Jefferson Medical College in 1835. He settled in Lancaster, S. C., and in 1840 established himself in Montgomery, Ala., going to New York in 1853. This is important, as his creative work, such as the invention of the speculum, and the repair of vesicovaginal fistula, took place while he was in Montgomery.

The author makes the mistake, so often corrected, of saying that Warren was first, in 1846, to operate using ether anesthesia. The credit belongs to Dr.

Crawford W. Long, of Athens, Ga., who used ether as a surgical anesthetic in 1842.

The book is full of interest from cover to cover, constantly reminds us of what we owe to the great men of the past, and emphasizes the importance of studying medical history. There is a good introduction by Francis R. Packard which will be useful to the average American reader. It is a book which should be found in every medical library, and would not be out of place in a general library.

MAZŸCK P. RAVENEL

Child Training and Parent Education: References to Material in Recent Books—*By Lucile Reiner Stebbing and Caroline Shurtleff Hughes (2nd ed.). New York: H. W. Wilson Co., 1939.* 83 pp. Price, $.90.

The references in the revised edition, *The Index on Child Training and Parent Education,* are in keeping with the newer trend in education, i.e., toward a consideration of the "whole child" in all of his relationships. Probably the most significant is that between himself and his parents, and much of the material in this reference book is centered around that parent-child relationship.

All of the books listed are from those published in the last 15 years, and the majority have been written in the last decade. The books in this compilation have been well chosen from among the vast amount of literature on the subject of child training and parent education, and the index should be of practical help to all who use it.

ETHEL GORDON

Nursing in Sickness and in Health: The Social Aspects of Nursing—*By Harriet Frost. New York: Macmillan,* 1939. 217 pp. Price, $2.00.

This book describes the way in which the health and social aspects of nursing are incorporated into the curriculum at the New York Hospital School of Nursing. "The first part deals with the general philosophy which should permeate every course of study and find application in every service of the hospital; it also describes certain courses used in building it up. The second part attempts to show the placement of the social elements as they appear and reappear throughout the curriculum in the above mentioned school. . . . This plan is presented, not as a model in any sense," but merely as a way one school has fused these elements in the curriculum.

Miss Frost's book will be warmly welcomed as the first publication to set forth in detail both the meaning of such instruction and a method for giving it, and the author has done an admirable job. She has written clearly, simply, and often graphically, and has given substance to what was before vague and shapeless. Many reports of student observations in ward, clinic, and home do much to present the patient as a human being influenced by his family relationships and his way of life and responding in his own way to doctors and nurses and to the hospital and clinic atmosphere. No one who reads this book can fail to garner a deeper insight into the purpose and true inwardness of nursing in sickness and in health, and a host of practical ideas of how it may be taught.

This reviewer does not think this book is the last word on the subject. Rather, it is the first exploration of this new field to be published, and points the way for further experimentation and enrichment; particularly is this true on the emotional side.

One feels perhaps a little more stress on man in the aggregate—man as an impersonal member of a community—than on the patient as a unique and original human being having his own peculiar emotional reactions to his

physical condition and the particular influences operating upon him. Not that these matters are overlooked but merely that their treatment might go deeper. One has a feeling, for instance, that the case studies are rather over-simplified. One could also wish that more light were thrown on the importance of the nurse's insight into fundamental factors underlying the patient's attitude and his family relationships as the basis for her selection of one out of several ways of working with him. Cultural and environmental factors are discussed, but the deeper sources of behavior lying in the personality are only hinted at and they are crucial to an understanding of the patient's attitude. Miss Frost often touches on points that might well be carried further in another book.

One delightful feature of the book is the presence and extraordinary choice of quotations with which Miss Frost heads her chapters.

In brief, Miss Frost has written an exceptionally helpful and timely book and all those who are interested in nursing education are her debtors.

ELIZABETH G. FOX

Nutrition and Physical Fitness—*By L. Jean Bogert, Ph.D. (3rd ed.). Philadelphia: Saunders,* 1939. 602 pp. Price, $3.00.

A large amount of new material has been incorporated in this edition, and at the time of completion the subject matter had been brought up to date. The treatment is adequate and authoritative. So far as possible the vocabulary is non-technical and the book can be read profitably by anyone who wishes to know something of nutrition and its relation to health, comfort, and efficiency.

The book covers a wide field and includes: the nature of foods, digestion, and metabolism; the specifications for adequate nutrition; current dietary fallacies; meal planning; and diets for special requirements. Earlier reviews should be consulted for a more detailed description of the table of contents. The chapter "Diseases in Which Diet Is of Major Importance" is omitted from this edition and a new chapter "Concerning Foods and Foodstuffs" has been added.

A. G. HOGAN

Medical Climatology—*By Clarence A. Mills. Springfield, Ill.: Thomas,* 1939. 296 pp. Price, $4.50.

The author, Professor of Experimental Medicine at the University of Cincinnati, has for many years studied the relationship of climate and weather to disease. He has supplemented observations on human diseases with experiments on animals under controlled conditions of temperature and humidity. In this book he has collected the results of his studies for the purpose of bringing before the medical profession and other interested persons the importance of the climatic environment on physiological activity and pathological conditions. He emphasizes that many other factors enter into the picture, but these are minimized in order to stress the importance of climatic factors.

In the 18 chapters of the book he develops the thesis that human existence depends on the energy generated in the body and the ability of the body to utilize this energy efficiently. He shows the effect of depressing environmental heat and of changes in environmental temperature and humidity on the metabolic activity of man, and he develops the thesis that excessive climatic stimulation encourages the development of metabolic diseases such as diabetes, hyperthyroidism, and pernicious anemia, whereas the lack of such stimulation lowers the resistance of the body in overcoming infections such as tuberculosis, appendicitis, and leprosy. He believes that arteriosclerosis and circulatory failure are encouraged by the increased metabolism associated with

stimulating climate and that abnormal mental functions of the body, as illustrated by suicides, homocides and mental breakdowns, have a similar relationship to climate.

He deals with the problem of heat stroke and points out that the heat regulatory mechanism of the body requires slow adjustment to excessive external temperatures, thus accounting for a higher incidence of heat stroke in cooler temperate zones and in the early periods of hot weather. He indicates that dental caries has a direct relationship to cooler climates but suggests that other factors, such as hardness of drinking water, are also involved. He deals with rheumatic fever and rheumatic heart disease, pointing out the greater resistance in stimulating climates and the more rapid progress of the pathology where the climatic stress is greatest. He recommends that therapeutic use be made of the known facts in relation to climate and disease, employing warm dry areas, such as the southwestern states, for such diseases as rheumatic fever, tuberculosis, and other respiratory infections; temperate or highly stimulating regions for leprosy; and warm, soothing climates, such as the Gulf Coast, for metabolic and circulatory diseases and nervous breakdowns.

The subject of the conditioning of indoor environments is dealt with and the advantages of radiant heat in regulating indoor temperatures is emphasized. It is pointed out, however, that practical methods for accomplishing this are not yet developed.

The final chapters deal with tides in sickness and death rates in relation to climate. The author attempts to correlate recent periods of higher mean temperatures not only with lowered death rates but also with periods of financial depression. He believes that higher temperatures have decreased infections and metabolic strain but at the same time have lowered man's mental activity and caused a slump in financial conditions.

Finally, he relates these same principles to geological history and suggests that the world has reached a peak of climatic stimulation and is now entering a period of increased warmth and racial recession.

The book is plentifully supplied with maps and graphs illustrating the subject matter. The maps outline areas of greatest climatic stimulation or depression in relation to the subjects under discussion. One feels that the limited amount of data on which some of them are based detracts from their conclusiveness.

Although the reviewer believes that the accumulation of more information will probably show that climatic influences are not as important as this book would lead one to believe, the author has contributed greatly to a field which heretofore has received insufficient attention. The book is well printed and should be of interest to all students of the ecology of disease.

HENRY E. MELENEY

Annual Report of the Surgeon General of the Public Health Service of the United States—For the fiscal year 1939. *Washington: U. S. Government Printing Office,* 1939. 185 pp. Price, $.75.

This report which records the activities of the U. S. Public Health Service for its 141st year of existence is notable since it was the last year in which this Service functioned under the Treasury Department, having been transferred to the Federal Security Agency at the close of the fiscal year.[1]

The Surgeon General pays a deserved tribute to the Treasury Department and its secretaries, saying that the credit for the sound growth of the Service has been due largely to them. He records the evolution of the Service from a small organization devoted entirely to

the medical care of American merchant seaman to a "national health agency, broad in scope and manifold in functions which affect directly or indirectly the health of the people," and expresses regret at the termination of the relationships which it has enjoyed for 141 years under the Treasury Department.

The essential function of the Public Health Service is coöperation with state health authorities in specific health problems and the furtherance of sound programs for the public health. Through active assistance under title VI of the Social Security Act, the counties under the administration of a full-time medical health officer reached 1,371, while 1,500 individuals received public health training for official positions. A total of $44,861,322 in state and local funds exclusive of those of large cities was available in the jurisdiction under which federal funds were budgeted, an increase of $13,265,454 over 4 years ago. For venereal diseases the federal funds allotted to states amounted to $2,400,000, supplementing funds amounting to $4,300,000 from state and local sources. Facilities for treatment as well as education concerning the venereal diseases are increasing enormously, and it is believed that the states are now prepared to use economically the $5,000,000 authorized for venereal disease control work. For the fiscal year 1940, $4,379,-250, or 86.9 per cent of the amount available, has been allotted.

Rocky Mountain spotted fever has been noted in several of the eastern states during the year and has now been reported in all but 7 states. Endemic typhus in the southern states has continued to spread, and in certain sections involves rural areas as well as cities. Weil's disease was recognized for the first time in New Jersey and Nevada. Dogs from Nevada, New York, and Pennsylvania suffered from the disease, and from rats in New York a virulent strain of the organism was isolated.

Naturally, cancer has occupied attention and the National Cancer Institute records progress. Grants-in-aid totalling $85,962.50 were recommended by the National Advisory Cancer Council and have been awarded to 13 institutions.

Health conditions generally improved in this country. No cases of cholera, yellow fever, or human plague were observed in 1938. Measles and smallpox were more prevalent than usual. In 1938 poliomyelitis showed a decline, but toward the close of the fiscal year there were epidemics in several states, and in the first half of 1939 the number of cases reported was 40 per cent higher than for the corresponding period of 1938.

Smallpox continues to be a blot on our record, 14,939 cases having been reported, or about twice the median for 1933–1937. There has been a steady increase since 1930, when about 5,000 cases were reported. The record for the United States is the worst of any country in the civilized world with the exception of India. Rocky Mountain spotted fever was reported from 32 states, 434 cases—an increase of 3 cases over the preceding year.

The provisional death rate for 1938 was 10.6, as compared to 11.2 for 1937, and 10.7 for 1933, the lowest general mortality rate recorded prior to 1938. Maternal mortality continued to decline for the 9th consecutive year.

For typhoid and paratyphoid fever, scarlet fever, diphtheria, poliomyelitis, epidemic cerebrospinal meningitis, tuberculosis, malaria, pellagra, diseases of the digestive system, nephritis, and diseases of pregnancy and childbirth, the rates were the lowest on record, while those for whooping cough, encephalitis, cerebral hemorrhage, diabetes, and diarrhea and enteritis among children under 2 years of age were about the same as in recent years. Cancer and heart disease were the only major causes of death showing higher rates. The

trend has been upward for both of these for several years, due in part to the greater number of people who reach the older ages when these diseases are more prevalent.

Cholera was found chiefly in India, China, and Indo-China, India reporting 356,373 cases, with 174,213 deaths, or more than twice the number reported for 1937. Plague was reported in India, Java, and Madura, Madagascar, Uganda, the Belgian Congo, Ceylon, Egypt, Kenya, and the Union of South Africa. Smallpox showed a decrease from 137,856 cases in 1937 to 124,269. Yellow fever was confined to a few small localities in Africa and South America. Extensive vaccination in the areas chiefly affected gave good results.

The Service receives current information on world prevalence of disease through the consulates, the Pan American Sanitary Bureau, the International Health Office in Paris, the Health Section of the League of Nations, foreign health services, and other organizations.

It is impossible to give details of this most interesting report as much of it is in summary. It should be read to be appreciated. MAZŸCK P. RAVENEL

REFERENCE
1. *A.J.P.H.*, Sept., 1939, p. 1044.

Death of a Yale Man—*By Malcolm Ross. New York: Farrar & Rinehart,* 1939. 400 pp. Price, $2.50.

This is not, as the title might indicate, a contribution in the field of vital statistics. The "death" described is merely the demise of the social attitudes characteristic of "good old Yale" twenty years ago. Malcolm Ross, after beginning a conventional career as a bond salesman was led by an instinct of adventure to roughing it in the oil fields and the coal mines, and then, by way of newspaper work reached an important post in the National Labor Relations Board. This book tells with extraordinary vigor and picturesqueness the tale of his experiences and of the broadening vision of human need and of the fundamental social problems involved in the relation between labor and capitalism. It is an absorbing story, recommended particularly to public health workers since our profession is—or should be—vitally concerned with the pressing social problems of the day in which public health plays so large a part.

C.-E. A. WINSLOW

Manual for Board Members—*Edited by Ella Geib Greene and Florence LaGanke Harris. Cleveland: Cleveland Child Health Association,* 1939. 42 pp., mimeographed.

This manual was prepared primarily for the members of the Board of Trustees of the Cleveland Child Health Association to give them, in the words of the President, "a comprehensive picture of the present program of the association and the manner in which it is administered through the activities of the Board of Trustees and the Staff." However, it should be of interest and service to others who are instituting or conducting similar activities in other communities.

The Cleveland Child Health Association is 10 years old and has made steady and unusual progress, in spite of the lean years due to the economic depression. Being a welfare agency dependent upon the Welfare Federation for the bulk of its budget, its finances have suffered due to the state of the federation funds. Nevertheless, with a wise and far-seeing director at its helm, it has been able to eliminate nonessentials and to develop those things which are most important in promoting the welfare of the children of a large city.

The *Manual* describes and gives a summary of the activities of the various committees of the organization, these reports being given in chronological

order following the chronological age of the child.

The association rightly puts great emphasis on its prenatal program. Its classes of private physicians as well as of clinics, for expectant mothers, under the direction of Mrs. Ellen D. Nicely, have grown and developed until they reach 5,000 expectant mothers a year—about one-third of those confined in Cleveland. Cleveland is leading in this program and has set an example for other cities to follow. The Cleveland Child Health Association was also a pioneer in establishing classes for "Expectant Fathers" in 1933.

The *Manual* as a whole is well written and any public health or welfare minded individual will find it interesting and informative reading.

E. V. THIEHOFF

Biological Products—*By Louis Gershenfeld. New York: Romaine Pierson Publishers,* 1939. 236 pp. Price, $4.00.

It would be axiomatic to imply that the intelligent therapeutic and prophylactic use of biologicals is predicated on a knowledge of at least the rudimentary principles of manufacture. This book is intended to supply students of medicine and of pharmacy with this information. The author has done a nice piece of work with a very complex subject. All of the important commercial biologicals are mentioned together with at least an outline of the method of manufacture and with detailed methods of standardization for those products that can be definitely standardized. Most of this latter material is taken from regulations of the U. S. Public Health Service. Although these are available on application, it is more convenient for the student to find them gathered under one cover.

The method for manufacture of antityphoid vaccine is that used by the Army Medical School and is presented in detail. Since the author has prepared such a comprehensive discussion, it would be superfluous to mention the various biologicals included. References to the literature are numerous and rather complete. The omission of the work of Kendrick and her associates on Pertussis Vaccine should be noted.

The book should be welcomed by teachers as well as by students.

JOHN F. NORTON

Butter—*By C. C. Totman, G. L. McKay, and C. Larsen (4th ed). New York: Wiley,* 1939. 472 pp., ill. Price, $3.50.

This book is a revision of *Principles and Practice of Buttermaking,* by the late G. L. McKay and C. Larsen. It departs from the earlier editions in that the buying and grading of cream and the coöperative market of butter are presented in considerable detail. As is explained in the preface, this book does not attempt to treat exhaustively the various topics presented and is apparently designed as a textbook for undergraduate instruction, dairy plant operators, and others interested in vocational training. Considerable material is presented in graphic form to facilitate instruction. The public health aspect of butter and buttermaking are not discussed.

M. E. PARKER

Stedman's Practical Medical Dictionary—*By Thomas Lathrop Stedman, M.D., and Stanley Thomas Garber, M.D. (14th ed.). Baltimore: Williams & Wilkins,* 1939. 1303 pp. Price, $7.00; $7.50 with thumb index.

When a dictionary has gone through 13 editions, successfully withstood the gamut of criticism, and established itself as an authoritative reference, it would usually be enough simply to announce the appearance of a new edition with a few comments as to enlargement, revision, being up-to-date, etc.

The present edition of Stedman requires a somewhat further notice, since the originator of this dictionary and its sole author from the first edition, died in 1938, at the age of 84. The 14th edition has been edited by his nephew, Dr. Garber, who collaborated in preparing this revision and who, at the request of Dr. Stedman, assumed the editorship of this and future editions.

A page from the preface to the 11th edition is included, which gives something of the history of Stedman's Dictionary. Medical writing apparently depreciated in quality both as to spelling and expression prior to 1908. At that time it had gotten so bad that Dr. Stedman felt the time had come "to stem the progress of medical cacography," so in that year the preparation of the first edition was begun and it appeared 3 years later.

There is no man in the medical profession to whom we are more indebted for the purification of medical orthography than Dr. Stedman. For 50 years through his editorials, writings, and translations, and for the past 28 years through his *Practical Medical Dictionary,* he fought consistently for correctness of terminology as well as of medical language in general.

The present edition shows careful revision and consideration of the multitude of new terms which have appeared. In scarcely any science have there been such rapid advances as in medicine and each one apparently brings with it a number of new terms more or less descriptive of the new findings. We need mention only the vitamins, the virus diseases, and immunity, to illustrate this point.

The make-up and printing of the book are excellent and it is not overburdened with illustrations. Opposite the title page is the Oath of Hippocrates handsomely printed with colored borders.

This dictionary can be recommended without reservation not only for those who are trying to improve their medical vocabulary, but also for editors, publishers, proof readers, abstracters, and all who have to do with medical literature.

MAZŸCK P. RAVENEL

Corrective Physical Education—*By Josephine Langworthy Rathbone, Ph.D. (2nd ed.). Philadelphia: Saunders,* 1939. 305 pp. Price, $2.50.

The new edition of this practical textbook has been thoroughly revised and brought up to date in modern methods of corrective physical education. A groundwork is laid in the essentials of anatomy, physiology and psychology. Especial attention has been given to the correction of psychophysical defects and a timely chapter on fatigue and relaxation has been added.

The simple line drawings and diagrams in the chapter on Reconstructive or Corrective Physical Education are unique and especially helpful in giving the student specific directions as to what type of exercise to prescribe. Chapters on Physical Recreation for the Handicapped and The School Problem complete the body of the text. A good glossary and a working bibliography add to the value as a modern textbook.

RICHARD A. BOLT

The Care and Handling of Milk—*By Harold E. Ross (2nd ed.). New York: Orange-Judd,* 1939. 417 pp. Price, $4.00.

The author states that in rewriting this book he has retained the same ideals as were in mind when the first edition was prepared, namely, to furnish as far as possible the latest information concerning the science and practice involved in the care and handling of milk. The book is intended as a text for dairy students and a guide for all who are interested in the production of milk and in its use as a

food. The training and experience of the author make him well qualified to do this as those who are familiar with the first edition can verify.

The same chapter headings as in the old edition are retained. Every chapter has been revised and some have been entirely rewritten. New sections have been added to several chapters and many new illustrations introduced. The important problems involved in the production, transportation, processing, and distribution of the nation's milk supply are ably discussed.

The author has succeeded well in his endeavor to bring the information in the book up to date. It is well written, clear, and concise. It contains much valuable information and deserves a place in the libraries of all who are interested in dairying and all schools which train farmers and dairymen. It is sound and authentic. The make-up and printing are good.

EARL R. GARRISON

Milk and Nutrition—*New Experiments Reported to the Milk Nutrition Committee. Part IV, The Effects of Dietary Supplements of Pasteurised and Raw Milk on the Growth and Health of School Children (Final Report); Summary of All Researches Carried Out by the Committee and Practical Conclusions. Reading (England): National Institute of Research in Dairying*, 1939. 70 pp. Price, $.75.

The unique value of milk in the diet is confirmed once again by the experiments described in this British report. From observations on 6,097 school children in four feeding groups, it was found that those who received supplementary milk, whether pasteurized or raw, showed greater increments in height, weight, and chest circumference than those who did not get extra milk. The increases were greater in the groups receiving ⅔ pint than in those favored with only ⅓ pint, but there were no differences in the growth promoting effects of raw and pasteurized milk. The milk-fed youngsters also displayed greater muscular strength, although not in proportion to the amount of milk consumed. Numerous tables are included to show specific data on the participants in the study.

The practical conclusions from all the researches, which began in 1935, are that milk is of great value for growth and health, and that there are no differences between the nutritive values of raw and pasteurized milk of any practical importance for school children who receive milk as part of their ordinary diet.

JAMES A. TOBEY

Pediatrics and Pediatric Nursing—*By A. Graeme Mitchell, M.D., B. K. Rachford, Echo K. Upham, R.N., and Elgie M. Wallinger, R.N. Philadelphia: Saunders*, 1939. 575 pp., ill. Price, $3.00.

This is an excellent textbook for the undergraduate nurse. Its numerous, valuable tables, book lists, outlines, definitions, summaries, questions and problems, charts and cross-indexing make it a particularly valuable reference book of elementary material for the public health worker.

While the material is inadequate in most of the "units" for the graduate nurse or the student of public health, it presents "Pediatrics for Nurses" in a logical, well organized form and with the point of view that the nurse will be "not simply a technician but rather an intelligent partner of the physician," and she will "teach children and parents proper principles of health and care in illness."

With the increased interest of public health workers in offering guidance in the use of the medical facilities of the community, there is need for a better understanding of other medical problems than those of communicable dis-

ease, the causes of infant mortality, and those diseases upon which the public health program is usually focused. The 17 short chapters on "Diseases of the Several Body Systems" provide a very satisfactory review of children's diseases and many medical problems that the public health worker should at least know about. As disease prevention is recognized as a field to which the practising physician contributes through early diagnosis and medical care, it is important that the public health worker realize what field the medical practitioner must cover. This "unit" provides much evidence of how diseases and physical handicaps can be prevented through case finding in the early stages and through guidance in obtaining service. This broad scope of material should be particularly useful to the public health worker without medical training who wants some general knowledge of children's medical problems.

HAROLD H. MITCHELL

Handbook of Chemistry—*By Norbert Adolph Lange (3rd ed.). Sandusky, Ohio: Handbook Publishers,* 1939. 1543 pp. Price, $6.00.

This is the third edition of a reference volume covering a great variety of chemical and physical data useful for those engaged in laboratory work. It succeeds the editions which appeared in 1934 and 1937. Although dealing principally with data relating to physical and chemical analysis, there are as well many subjects of interest to biologists who deal with water, with milk and milk products, and to those in common with chemists and physicists who depend on mathematical tables. Even a list of the subjects covered would require several pages, and one who is not dealing routinely with the changes in our knowledge of chemistry and physics is deeply impressed with the comprehensiveness of this volume which is more like the World Almanac than any other current publication. This reviewer intends to keep a copy available for frequent editorial reference.

REGINALD M. ATWATER

Accepted Foods and Their Nutritional Significance—*Chicago: American Medical Association,* 1939. 492 pp. Price, $2.00.

This volume contains descriptions of the products which were on the list of accepted foods on September 1, 1939, classified into several categories, and listed in their classes in alphabetical order. These products are those which have been submitted to the Council and found satisfactory on the basis of evidence supplied by the manufacturer or independently secured by the Council.

In addition to the above, the rules and regulations of the Council and general decisions concerning food composition and nutritional claims which may be used in advertising matter are discussed. There is also given the Council's opinion regarding many topics in the field of nutrition.

The Council recognizes that the material in this book is likely to be out of date by the time it is published, hence frequent revisions are necessary and plans are being made to revise the volume from time to time.

This outline, which embodies what the Committee claims for the book, is good as far as it goes, but does not do justice to the contents. For example, the article on Milk and Milk Products Other than Butter, requires more than 60 pages. This includes a list of manufacturers and distributors of accepted products. Indeed, while the book is intended largely to prevent frauds in food products and false advertisement, it is almost a textbook on nutrition, which can be recommended to all interested in this great subject.

MAZŸCK P. RAVENEL

BOOKS RECEIVED

GOOD HEALTH AND BAD MEDICINE. By Harold Aaron. New York: McBride, 1940. 328 pp. Price, $3.00.

REPORTS ON MEDICAL PROGRESS, 1939. As Published in the *New England Journal of Medicine*. Compiled and Edited by Robert N. Nye. Boston: Little Brown, 1940. 562 pp.

FOURTH SARANAC LABORATORY SYMPOSIUM ON SILICOSIS. Edited by B. E. Kuechle. Wausau, Wis.: Employers Mutual, 1939. 379 pp. Price, $3.00.

MODERN DIABETIC CARE, INCLUDING INSTRUCTIONS IN THE DIET AND THE USE OF THE OLD AND NEW INSULINS. By Herbert Pollack. New York: Harcourt, Brace, 1940. 216 pp. Price, $2.00.

NON-PROFIT HOSPITAL SERVICE PLANS. By C. Rufus Rorem. Chicago: Commission on Hospital Service (18 East Division Street), 1940. 130 pp. Price, $.50; 4–10 copies, $.25 each; 11 or more, $.15 each.

HEIL HUNGER! HEALTH UNDER HITLER. By Dr. Martin Gumpert. New York: Alliance Book Corporation, 1940. 128 pp. Price, $1.75.

SOCIAL WORK ENGINEERING: AN OUTLINE OF TOPICS FOR SURVEY, PLANNING AND APPRAISAL. By June Purcell Guild and Arthur Alden Guild. New York: Harper, 1940. 136 pp. Price, $1.75.

FUNCTIONAL HUMAN ANATOMY. By Cleveland Pendleton Hickman. New York: Prentice-Hall, 1940. 501 pp. Price, $3.75.

QUANTITY FOOD SERVICE RECIPES. Compiled by Administration Section of the American Dietetic Association. Philadelphia: Lippincott, 1940. 436 pp. Price, $4.00.

BIBLIOGRAPHY OF SWIMMING. Compiled by Frances A. Greenwood. New York: Wilson Co., 1940. 308 pp. Price, $4.25.

INTRODUCTION TO HOUSING: FACTS AND PRINCIPLES. By Edith Elmer Wood. Washington: Government Printing Office, 1940. 161 pp. Price, $.30.

THE SOCIAL FUNCTION OF SCIENCE. By J. D. Bernal. New York: Macmillan, 1939. 482 pp. Price, $3.50.

CIVIL SERVICE IN PUBLIC WELFARE. By Alice Campbell Klein. New York: Russell Sage, 1940. 444 pp. Price, $2.25.

EDUCATION OF THE HANDICAPPED. Volume II: Problems. Edited by Merle E. Frampton and Hugh Grant Rowell. Yonkers: World Book Co., 1940. 440 pp. Price, $2.80.

THE GIRL TODAY—THE WOMAN TOMORROW. Lucretia P. Hunter. Rev. ed. New York: Allyn & Bacon, 1939. 374 pp. Price, $1.20.

MIGRATION AND SOCIAL WELFARE. By Philip E. Ryan. New York: Russell Sage, 1940. 114 pp. Price, $.50.

FAITHS THAT HEALED. By Ralph H. Major. New York: Appleton-Century, 1940. 290 pp. Price, $3.00.

THE REORGANIZATION OF PUBLIC ASSISTANCE. Report 1938–1939. Department of Welfare, City of New York, 1940. 193 pp.

MAKING THE MOST OF MATURITY. Life Conservation Service of the John Hancock Mutual Life Insurance Co., Boston, Mass., 1940. 31 pp.

EXERCISE AND KEEP FIT. By Terry Hunt. New York: Prentice-Hall, 1940. 202 pp. Price, $1.96.

FETAL AND NEONATAL DEATH: A Survey of the Incidence, Etiology, and Anatomic Manifestations of the Conditions Producing Death of the Fetus in Utero and the Infant in the Early Days of Life. By Edith L. Potter and Fred L. Adair. Chicago: University of Chicago Press, 1940. 207 pp. Price, $1.50.

STAGE FRIGHT AND WHAT TO DO ABOUT IT. By Dwight Everett Watkins and Harrison M. Karr. Boston: Expression Company, 1940. 110 pp. Price, $1.50.

EATING YOUR WAY TO HEALTH. Published and Prepared by The Central Nutrition Committee, Department of Public Instruction, Honolulu, T. H., 1939. 31 pp.

A SELECTED PUBLIC HEALTH BIBLIOGRAPHY WITH ANNOTATIONS

RAYMOND S. PATTERSON, PH.D.

An Annotation for You to Complete—Although the diets of 80 normal adolescent girls were generally poor, being deficient in vegetables, fruit, milk, and whole cereals, about half had optimum weight. No statistical relationship between diet and caries could be established, probably because none of the diets were good enough to have a protective influence.

BAYER, L. M. The Diet of Adolescent Girls. J. Pediat. *16, 1:56* (Jan.), *1940*.

Horse Encephalitis — Vaccination of volunteers with chick embryo culture vaccines of equine encephalitis suggests the safety and value of this prophylactic procedure.

BEARD, J. W., *et al.* Vaccination of Man against the Virus of Equine Encephalomyelitis (Eastern and Western Strains). J. Immunol. 38, 2:117 (Feb.), 1940.

Practical Public Dental Hygiene—Assuming that you agree with him that dental defects are the most common of all physical defects in children, that the corrective program is far behind the incidence rate, and that dental disease is detrimental to health, the author asks you to follow him through the list of workers who might possibly undertake a dental health educational service. You'll have to read this excellent paper to get the answer.

CHOPE, H. D. An Administrator Cogitates His Dental Health Program. J. School Health. 10, 2:31 (Feb.), 1940.

More about Intradermal Vaccination—Another report on intradermal vaccination with culture virus suggests that it is not quite as effective as the ordinary cutaneous method using calf lymph virus. Although mild reactions were the rule, some marked cutaneous reactions occurred.

DONNALLY, H. H., *et al.* Smallpox Vaccination of Newborn Infants with Culture Virus and with Calf Lymph Virus. Am. J. Dis. Child. *59, 2:322* (Feb.), *1940*.

For Gullible Venereal Patients—An investigator visited all sorts of drug stores the country over, telling about a friend who had symptoms presumably of both gonorrhea and syphilis: only 7 per cent of the druggists refused to sell venereal remedies, 62 per cent offered to diagnose and treat the case, whereas 31 per cent were not willing to make a diagnosis but would sell nostrums. This record is much worse than that of a similar study made 6 years previously. Quackery too is rampant.

EDWARDS, M. S., and KINSIE, P. M. Illegal and Unethical Practices in the Diagnosis and Treatment of Gonorrhea and Syphilis. Ven. Dis. Inform. *21, 1:1* (Jan.), *1940*.

Cold Checks Embryonic Growth—This is the clearest and most informative article that we have seen on the treatment of cancer by refrigeration.

FAY, T. Human Refrigeration. Quart. Rev. (New York City Cancer Comm.). 4, 4:68 (Jan.), 1940.

Just the Usual Routine—The 75 different activities that local health departments should be carrying on makes an imposing list of responsibilities.

FOOTE, F. M. Your Town: Certain Responsibilities of Health Officers. Month. Health Bull. (Connecticut). 54, 1:3 (Jan.), 1940.

A British Health Problem—We are not alone in our troubles with our social problems. In England a plan was devised for selling milk to necessitous families at a reduced price. One gathers from the health officer's article criticising the scheme, that it won't please the health officials or the milk distributors, and that it is an underhanded method of unloading surplus milk. They should try our colored stamp scheme.

GALLOWAY, J. F. The Reduced-Price Milk Scheme Examined and Criticized. Pub. Health. 53, 5:105 (Feb.), 1940.

The Why of Exhibits—No educational method is a cure-all, but the exhibit reaches many who do not care, who seldom listen to the radio health talk, read a pamphlet, attend lectures, or see a doctor if they can help it, concludes this discussion of the cancer exhibit at the New York World Fair.

GEBHARD, B. Mass Education by Health Exhibits. Quart. Rev. (N. Y. City Cancer Comm.). 4, 4:80 (Jan.), 1940.

Vaccination Prevents Smallpox—It seems that smallpox has been wiped out in Montreal by vaccination.

GROULX, A. Elimination of Smallpox in Montreal by Vaccination. Canad. Pub. Health J. 31, 1:6 (Jan.), 1940.

Children's Diseases—Disabling illnesses that kept children home for at least 7 days were more frequent among children under 10 than over that age; 4 out of 5 illnesses were acute communicable or respiratory diseases—against which something might be done. Orthopedic impairments were largely congenital defects, accidental injury and poliomyelitis.

HOLLAND, D. F. The Disabling Diseases of Childhood. Pub. Health Rep. 55, 4:135 (Jan. 26), 1940.

Kinds of Medical Care for a Half Million Children—You may have anticipated these findings but the nation-wide survey reveals that children in families of high income level, received more intensive care when sick outside the hospitals than did those of low income families. There are other findings that you may not have anticipated, so the paper should be studied in its entirety.

HOLLAND, D. F. The Disabling Diseases of Childhood. Pub. Health Rep. 55, 6:227 (Feb. 9), 1940.

Dollars and Dental Caries—One reason for annotating this paper is to use the word "odontothanatotic"; the other is to report its conclusions which are: the tendency of children to dental caries attack is not directly related to the economic status of the community, but the volume of dental care received is. The odontothanatotic rate diminishes as the economic level rises. Now, you see, you'll have to read the paper.

KLEIN, H., and PALMER, C. E. Community Economic Status and the Dental Problem of School Children. Pub. Health Rep. 55, 5:187 (Feb. 2), 1940.

Old People, Too, Are Humans—Here is a milestone: a symposium on senescence. Explorations in this largely untilled field are made by a dozen competent pioneers.

LAWTON, G., *et al.* Old Age and Ageing. (6 papers.) Am. J. Orthopsychiatry. 10, 1:27 (Jan.), 1940.

On Original Sin—British views on the subjects of problem parents, difficult children, and awkward families, all are applicable on this side of the ocean. The conclusion seems to be that difficult personalities, like crooked noses, run in families.

MACCALMAN, D. R., *et al.* Discussion of Family Discords. J. Roy. San. Inst. 60, 8:301 (Feb.), 1940.

Latest News about Vitamins—Knowledge of vitamins grows at such a pace that an annual review of the progress becomes necessary. If read with an eye on the preceding statements, the current review provides all the ordinary health worker needs to know on this important subject.

MEIKLEJOHN, A. P. The Vitamins. New Eng. J. Med. 222, 8:313 (Feb. 22), 1940.

Nose - Holding Department — Though no new or radical changes in sewage treatment methods appeared in 1939, the established processes were made more dependable: it was a year of real progress, giving rise to hopes for continuing improvement—so says this competent reporter.

RUDOLFS, W. Developments in Sewage and Waste Treatments During 1939. Munic. San. 2, 2:57 (Feb.), 1940.

Children's Needs in a New Decade—This fourth in a series of decennial national conferences on child life was outstanding in many ways including the attendance of 672 important people, the scope of its coverage, the breadth and depth of its findings. The whole issue of this magazine is devoted to the subject.

SPRINGER, G., and CLOSE, K. Children in a Democracy (and 4 related papers). Survey Midmonthly. 76, 2:37 (Feb.), 1940.

Colds May Be Something Else—Observations made upon several classes of small children have revealed so many youngsters with signs of upper-respiratory infection toward the end of the incubation period following exposure to such communicable diseases as scarlet fever, measles, and chicken pox, that one may assume that the etiologic agents of these diseases may manifest themselves as ordinary colds more frequently than we think.

TURNER, N. C. Common Colds. New Eng. J. Med. 222, 5:184 (Feb. 1), 1940.

Population vs. Pollution—Modern pollution preventive practices aim to fit the treatment method to the stream. A balanced viewpoint is ably presented here.

WOLMAN, A. Pollution Control—Where Does It Stand? Munic. San. 2, 2:64 (Feb.), 1940.

ASSOCIATION NEWS

SIXTY-NINTH ANNUAL MEETING
DETROIT, MICH., OCTOBER 8-11, 1940
HEADQUARTERS
Book-Cadillac Hotel and Hotel Statler

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Lieutenant Frederick R. Lang, M.D., M.P.H., Bureau of Medicine and Surgery, Navy Dept., Washington, D.C., Assistant to Chief of Division of Preventive Medicine
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Donald H. Eckles, M.D., Bryn Mawr Gables, Bryn Mawr, Pa., Trainee, Univ. of Pa., School of Public Health
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Lucile H. Hamlin, A.B., 1831 Arch St., Berkeley, Calif., Associate in Public Health, Dept. of Hygiene, Univ. of Calif.
Eric G. Johnson, M.D., Shiprock, N. M., Physician, U. S. Indian Service
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William E. Turner, M.D., 3901 First Ave., Sacramento, Calif., Venereal Disease Clinician, State Dept. of Public Health
Alwine M. van Allen, 1336 Walnut St., Berkeley, Calif., Student, Univ. of Calif.
Harry J. Warner, M.D., 404 Federal Bldg., Spokane, Wash., Medical Director, U. S. Indian Service

DECEASED MEMBER

George W. Hemmeter, M.D., Baltimore, Md., Elected Member 1936

INDUSTRIAL HYGIENE REPORTS AVAILABLE

THROUGH the courtesy of the Division of Industrial Hygiene, U. S. Public Health Service, Washington, D. C., copies of 4 reports, prepared under the auspices of the Section on Industrial Hygiene by Henry F. Smyth, M.D., Dr.P.H., have been made available. Two of these reports relate to industrial anthrax, one to volatile solvents and the other to skin irritants.

STANDARD METHODS FOR THE EXAMINATION OF WATER AND SEWAGE

THIS volume, now in its Eighth Edition, is a joint publication between the American Water Works Association and the American Public Health Association. The Joint Editorial Committee between the two organizations is being reorganized, looking toward the production of the Ninth Edition. The three A.P.H.A. representatives on the Joint Committee have been appointed by the Committee on Research and Standards and this list is now made up of W. L. Mallmann, Ph.D., Michigan State College, A. M. Buswell, Ph.D., University of Illinois, and John F. Norton, Ph.D., Kalamazoo, Mich. The A.W.W.A. representatives are Messrs. Hatfield, Leverin and Schwartz. A preliminary organization meeting of this group will be held in May in Chicago.

VOLATILE SOLVENTS

THE Publication Office of the American Public Health Association regrets two errors occurring in the 1939–1940 Year Book, in connection with the Committee on Volatile Solvents. The personnel as given on page 32 is incorrect. It should be as follows:

Henry F. Smyth, Jr., Ph.D., *Chairman*
W. P. Yant
Dr. Don D. Irish
Warren Cook
Henry Field Smyth, M.D.

Further, the credit for mimeographing is erroneously given. This report has been made available through the courtesy of Dr. Henry F. Smyth, Jr., and the mimeographing was done at the Mellon Institute of Industrial Research.

EMPLOYMENT SERVICE

The Employment Service will register persons qualified in the public health field without charge. Replies to these advertisements, when keyed, should be addressed to the American Public Health Association, 50 West 50th Street, New York, N. Y., identifying clearly the key number on the envelope.

POSITIONS AVAILABLE

WANTED—A city health officer for city of 32,000 population. Applicant must have a year of postgraduate training in public health and some administrative experience in public health as city, county, or district health officer. U. S. citizenship required. W450

Young, energetic, well trained public health nurses needed in Montana for rural areas. Salary $135 per month, plus travel. Write Supervisor of Public Health Nursing, Montana State Board of Health, Helena, Mont.

POSITIONS WANTED

Physician, M.D., McGill; C.P.H., Johns Hopkins; excellent background of communicable disease control and school health service, seeks position as epidemiologist or public health administrator. A368

Well qualified woman physician, M.A. and M.D. from Stanford, with 6 years' experience in nationally known secondary school in health education and medical advisory duties, wishes position in college health work. H148

Young man, bacteriologist, especially trained in viruses and rickettsial and all phases of public health laboratory work; Sc.D., Johns Hopkins; now assistant state laboratory director; qualified to consider teaching, executive, administrative, or research position; particularly interested in and qualified for practical laboratory methods with viruses. L151

Woman statistician, experienced in supervision, statistical analysis, etc., will consider change of position. Year's course in public health and vital statistics at Harvard. Serving now as statistical supervisor. S152

NEWS FROM THE FIELD

SENATE HEARING ON PRESIDENT'S HOSPITAL BILL

A SUB-COMMITTEE of the Senate Committee on Education and Labor, of which Senator Murray of Montana is Chairman, held hearings in Washington on March 18–19 on the Bill (S. 3230) introduced by Senators Wagner of New York and George of Georgia, appropriating 10 million dollars for the building at federal expense of some 50 small hospitals throughout the most economically depressed areas of the country (see *A.J.P.H.*, March, 1940, p. 312).

Among other organizations, the American Public Health Association was represented through its committee authorized to confer with federal agencies, by Reginald M. Atwater, M.D., Executive Secretary, who appeared at the hearing on April 19. The testimony on behalf of the Association is summarized as follows:

1. The American Public Health Association records its satisfaction in this Bill as reflecting a continuing interest of the federal government in the health of the nation.

2. There are large areas in many of our states which do not enjoy the benefits of adequate health service and in which there is a notable lack of hospital facilities. The Association has approved the expansion of public health services, including necessary medical, hospital and nursing care, to families unable to obtain adequate care through their own resources.

3. All appraisals of national health resources reveal the existence of many communities in which hospital facilities are meager or lacking. The inadequacy of institutional facilities presents a handicap to the control of tuberculosis, mental disease, and many other important conditions, and those requiring care in hospitals are deprived of the full benefits of modern medical treatment. A concept of the close interrelationship between preventive and curative medicine, we believe, is basic to the public health program. We wish to be recorded as opposed to any plan which regards treatment and cure as belonging in watertight compartments.

4. The Association has endorsed in general the plans for federal aid to the states for the construction of additional hospital facilities and hospital care as needed.

5. We believe that it is essential that any program to be worthy of federal aid should include adequate provisions for the maintenance of high personnel standards and that the benefit from federal aid to such local agencies should be withheld when it is found that substandard services are being furnished.

6. Specifically with regard to S. 3230, we find that the provisions of the Bill afford a desirable latitude to the states and localities in defining the population to be served by such hospitals.

We approve the Bill in principle as it provides for a National Advisory Hospital Council under the Chairmanship of the Surgeon General of the Public Health Service and for a review by the Council of applications for aid under the Act.

We also approve the authority to formulate standards for proper conduct of the hospitals and for maintenance of high professional levels of service.

We regard as especially important the provision for the training and instruction of personnel.

The Association approves a liberal definition of the term "hospital" as contained in the Act because there is a variety of structures like dispensaries or health centers, laboratories, x-ray units, etc., which will best serve some of the rural communities and the economically depressed areas.

It would appear to the representatives of the American Public Health Association that the proposal advocated by S. 3230 is a step in the right direction, but clearly not an adequate answer to the need of the country for a national health program or an answer to the need of local areas for adequate health services. We shall not be content to substitute this hospital bill for other essential elements in a national health program, nor would we be willing to see the purpose of this act carried out at the expense of basic public health services which are now only poorly financed.

OLD AGE SECURITY FOR EMPLOYEES OF NON-PROFIT ORGANIZATIONS

THE Federal Old Age Retirement Plan under the Social Security Act has recently become a reality with the payment of the first monthly checks to those persons 65 years of age who are included in the plan. However, all employees of social agencies, voluntary health groups, educational and other non-profit institutions have been reminded that they are ineligible for these benefits because of requests made when the plan was set up by representatives of their own groups. Fearing that the cost of employer contributions and the danger of losing tax exempt status might work a hardship on the organizations, many asked exemption when the original Social Security Act was before Congress.

Today, according to Alan T. Burns, Executive Vice-President of Community Chests and Councils, Incorporated, who is Secretary of a special committee on this subject, it looks different to many long-sighted organizations who see in federal retirement insurance the best and least expensive means of giving to their employees a measure of protection consistent with their own high social standards. This committee believes that the sooner such coverage for non-profit institutions is secured, the more the organizations and their employees will profit, since monthly benefit payments increase with each year the employee works before retirement.

An amendment to the Social Security Act will soon be proposed designed to eliminate the exemption of services performed in the employ of non-profit agencies from coverage under the Old Age and Survivors' insurance program. Legal authorities are agreed that the proposed amendment eliminates any apprehension lest these organizations lose their tax-exempt status, because of the provision that contributions from non-profit organizations and their employees will be deposited directly into the Old Age and Survivors' Insurance Trust Fund, rather than into the general Treasury for appropriations.

The amendment as proposed is sponsored by a representative group of agencies from the social work field, and a considerable number of health agencies have shown an interest because of an increasing desire of their staffs to be included. If the Act becomes operative in 1941 as expected, both employers and employees would pay 1 per cent annually on the first $3,000 of an employee's salary for the years 1941–42. The payments would increase to 2 per cent for the next three years, followed by three years at 2½ per cent, and thereafter payments of 3 per cent would be required by both employer and employee.

MARYLAND CONFERENCE

THE 20th Annual Health Conference of the Maryland State Department of Health field and departmental staffs will be held in Baltimore, and May 3 has been selected as the provisional date. Dr. Robert H. Riley, State Commissioner, will preside at this meeting when the pneumonia control program will be discussed.

Among the speakers will be Lloyd D. Felton, M.D., of the National Institute of Health, Washington, D. C., who will present a preliminary report on the preventive campaign carried on in Washington County, and Maurice C. Pincoffs, M.D., Chairman of the Pneumonia Control Committee of the Maryland State Board of Health, who will review the findings with regard to the use of sulfapyridine in the treatment of pneumonia.

INDIAN SERVICE TUBERCULOSIS INSTITUTE

AN Indian Service Tuberculosis Institute was held during February at the Navajo Medical Center, Fort

Defiance, Ariz., under the direction of Dr. Esmond R. Long and Margaret Smith of the Henry Phipps Institute, Philadelphia.

Other participants in the program were representatives of the U. S. Public Health Service loaned to the Indian Service medical staff, including Dr. Estella F. Warner, of Albuquerque, N. M., Dr. L. B. Snavely, of San Francisco, Calif., Dr. B. Sedlacek, of Fort Defiance, Ariz., Dr. W. G. Lewis, of Winslow, Ariz., and Dr. Archie Sheinmel, of the U. S. Indian Service.

The attendance included 121 persons from the eleven Indian agencies in the Southwest.

GOVERNMENTAL INDUSTRIAL HYGIENISTS

IN connection with the Third Annual Conference of Governmental Industrial Hygienists, J. J. Bloomfield, as Secretary-Treasurer of the Conference, has announced that the program to be held in Washington, D. C., April 30–May 2, will convene in Wilson Hall of the Administration Building of the National Institute of Health, Bethesda, Md.

The program is planned to cover topics relating to industrial hygiene of interest both to the federal and state administrators. A symposium on Interdepartmental Relationships between State Industrial Commissions, State Departments of Health, the Medical Profession and official industrial hygiene services will be a feature of the program, which will also include many reports of conference committees. Copies of the program may be obtained from Mr. Bloomfield at the Public Health Service in Washington.

DE KRUIF ARTICLES REPRINTED

THE Curtis Publishing Company, Philadelphia, has assembled in reprint form three articles by Paul de Kruif, which appeared in the October and December, 1939, issues and the January, 1940, issue of *The Country Gentleman* under the title "The People Demand Public Health." The titles of the articles are "Public Health Is Good for Doctors," "Public Health Needs the Doctors," and "The People Demand Public Health."

PERSONALS

Central States

HENRY H. ASHER, M.D.,† has been appointed as Health Officer of Sedgwick County, Kans., succeeding FLOYD C. BEELMAN, M.D.†

FLOYD C. BEELMAN, M.D.,† of Wichita, Kans., for 3 years Health Officer of Sedgwick County, has accepted the position of Director of the Division of Tuberculosis Control of the Kansas State Board of Health.

HAROLD S. DIEHL, M.D., Sc.D.,* Dean of the University of Minnesota Medical School, Minneapolis, Minn., has been appointed a member of the National Advisory Health Council of the U. S. Public Health Service.

DR. HALE F. SHIRLEY, Assistant Professor of Psychiatry, State University of Iowa College of Medicine, Iowa City, Ia., has been appointed Assistant Professor of Psychiatry and Pediatrics, and Director of the new Child Guidance Clinic at Stanford University School of Medicine, Stanford University, Calif.

Southern States

DR. WILLIAM M. ASKEW, JR., formerly of Auburn, Ala., has been named Health Officer of Butler County, succeeding DR. THOMAS C. ELLIOTT, of Greenville, resigned.

FRANKLIN A. CLARK, of the U. S. Public Health Service, has been appointed Director of the Division of Inspection of the Alabama State Depart-

* Fellow A.P.H.A.
† Member A.P.H.A.

ment of Health, succeeding C. A. ABELE, CH.E.,* who left to become Director of the Division of Dairy Products of the Board of Health of Chicago, Ill.

J. MCIVER JACKSON, M.D., has been appointed Health Officer of Prince William Stafford County District, Va., succeeding DR. GARNETT SNEAD.

DR. THOMAS F. MCGOUGH has been appointed Assistant Health Officer of Pulaski County, Va.

DR. CLARK E. PHILLIPS, of Orange, Tex., has been appointed Health Officer of Orange County, to succeed the late DR. JEFFERSON D. YATES.

DR. ROY J. SETTLE, formerly of Inman, S. C., has been elected Health Officer of Clarke County Ala., succeeding BENJAMIN S. BLACK, M.D.,† who resigned to enter private practice in Chicago.

DR. CECIL G. YARBROUGH, JR., of Midland, Tex., has been appointed Health Officer of a new Midland city and county health unit.

Western States

DR. FREDERICK T. BURKE, of Timber, Ore., has been appointed Health Officer of Washington County, succeeding RICHARD N. SHERWIN, M.D.,† of Hillsboro, who resigned.

JOHN J. SIPPY, M.D.,* District Health Officer of the San Joaquin Local Health District, Stockton, Calif., has announced that grants have been made by the International Health Division of the Rockefeller Foundation and the California State Department of Public Health to support an epidemiological and statistical study of syphilis in the San Joaquin Local Health District unit under the directorship of ROBERT DYAR, M.D.† According to Dr. Sippy, it is expected that the study will last from three to five years and will include the analysis of syphilis prevalence and the efficacy of control methods and treatment methods. In addition to the coöperation of the entire staff, Dr. Dyar will have the assistance of a public health nurse and a statistical clerk.

Canada

DR. GEORGE H. JOHNSON, of Vancouver, B. C., Can., has been appointed Health Officer of Clark County, Wash., to succeed JOHN A. KAHL, M.D.†

DEATHS

MELVILLE D. DICKINSON, M.D.,† formerly a District Health Officer on the staff of the New York State Department of Health, with jurisdiction over Nassau and Suffolk Counties, died January 30.

SVEN R. LOKRANTZ, M.D.,* Director of Health Service, Los Angeles, Calif. City Schools, died recently.

JAMES ROBERTS, M.D.,* Medical Officer of Health, Hamilton, Ont., Canada, died March 15.

* Fellow A.P.H.A.
† Member A.P.H.A.

CONFERENCES AND DATES

American Academy of Political and Social Science. Philadelphia, Pa. April 12–13.

American Association for Health, Physical Education, and Recreation (division of the National Education Association). Hotel Stevens, Chicago, Ill. April 24–26.

American Association for Social Security. New York, N. Y. April 12–13.

American Association of Public Health Dentists. Cleveland, Ohio. September 8–9.

American Association of Social Workers (Delegate Conference). Grand Rapids, Mich. May.

American Association of the History of Medicine. Atlantic City, N. J. May 4–5.

American College of Physicians—24th Annual Session. Cleveland, Ohio. April 1–5.

American Dental Association. Cleveland, Ohio. September 9–13.

American Dietetics Association — 23rd Annual Meeting. New York, N. Y. October 21–24.

American Heart Association. Scientific Meeting. Hotel Roosevelt, New York, N. Y. June 7–8.

American Home Economics Association —33rd Annual Meeting. Cleveland, Ohio. June 23–27.

American Hospital Association. Boston, Mass. September 16–20.

American Library Association. Cincinnati, Ohio. May 26–June 1.

American Medical Association — 91st Annual Meeting. Waldorf-Astoria Hotel, New York, N. Y. June 10–14.

American Pediatric Society. Skytop, Pa. May 2–4.

American Public Health Association —69th Annual Meeting. Book-Cadillac Hotel, Statler Hotel, Detroit, Mich. October 8–11.

American Red Cross—Annual Convention. Washington, D. C. April 1.

American Scientific Congress—8th. In connection with celebration of 50th Anniversary of founding of the Pan American Union. (First Section meeting, May 13.) Washington, D. C. May 10–18.

American Society of Biological Chemists. New Orleans, La. April 13–17.

American Society of Civil Engineers. Spring Meeting. Kansas City, Mo. April 17–19. Summer Meeting. Denver, Colo. July 24–26.

American Society of Planning Officials. National Conference on Planning, in coöperation with American Institute of Planners, American Planning and Civic Association, and National Economic and Social Planning Association. San Francisco, Calif. July 8–11.

American Water Works Association—60th Annual Meeting. Kansas City, Mo. April 21–25.

Indiana Section—Purdue University, West Lafayette, Ind. April 4–5.

Montana Section—New Milligan Hotel, Miles City, Mont. April 5–6.

Ohio Section — Mayflower Hotel, Akron, Ohio. May 9–10.

Pacific Northwest Section—Portland Hotel, Portland, Ore. May 9–11.

Florida Section — Seminole Hotel, Jacksonville, Fla. May 16–18.

Illinois Section—Congress Hotel, Chicago, Ill. May 22–24.

New York Section — Ithaca Hotel, Ithaca, N. Y. June 6–7.

Michigan Section — University of Michigan Union, Ann Arbor, Mich. September 11–13.

Rocky Mountain Section—Denver, Colo. September 16–17.

Western Pennsylvania Section — Castleton Hotel, New Castle, Pa. September 18–20.

Southwest Section — Mayo Hotel, Tulsa, Okla. October 14–17.

New Jersey Section—Atlantic City, N. J. October 18–19.

Kentucky-Tennessee Section — Lafayette Hotel, Lexington, Ky. October 21–23.

California Section—Los Angeles Biltmore Hotel, Los Angeles, Calif. October 23–26.

Minnesota Section—St. Paul Hotel, St. Paul, Minn. November 7–8.

Arizona Public Health Association. Tucson, Ariz. April 16–17.

Association of American Medical Colleges. Ann Arbor, Mich. October 28–30.

Association of American Physicians. Atlantic City, N. J. May 7–8.

Building Officials Conference of America. St. Louis, Mo. June 3–6.

Central Atlantic States Association of Dairy, Food and Drug Officials—Annual Conference. Hotel Raleigh, Washington, D. C. May 16–17.

Citizens' Conference on Government Management. University of Denver. Estes Park, Colo. June 17–22.

Civil Service Assembly. Central Regional Conference, Chicago, Ill., May 15–17. Western Regional Conference, Portland, Ore., June 24–26. Eastern Regional Conference, June.

Conference of State and Provincial Health Authorities of North America. Washington, D. C. May 7–8. (May 11, at National Institute of Health.)

Conference on Educational Policies—Eighth. Teachers College, Columbia University, New York, N. Y. April 4.

Convention for the Revision of the Pharmacopoeia of the United States. Washington, D. C. May 14.

Dairy Industries Supply Association. Atlantic City, N. J. October 21–26.

Florida Public Health Association. Tampa, Fla. December.

Governmental Industrial Hygienists—Annual Conference. Wilson Hall, Administration Building of the National Institute of Health, Bethesda, Md. April 30, May 1–2.

Greater New York Safety Convention—11th Annual. Pennsylvania Hotel, New York, N. Y. April 16–18.

Health Officers and Public Health Nurses—Annual Conference. Under the Auspices of the New York State Department of Health. Saratoga Springs, N. Y. June 24–27.

Indiana State Medical Association. French Lick Springs Hotel, French Lick, Ind. October 29–31.

Institute of Food Technologists—First Meeting. Morrison Hotel, Chicago, Ill. June 17–19.

Institute of Government. University of Southern California, Los Angeles, Calif. June 10–14.

International Association of Milk Sanitarians. Joint Meeting with the New York State Association of Dairy and Milk Inspectors. Hotel Pennsylvania, New York, N. Y. October 17–19.

International Association of Public Employment Services. Kansas City, Mo. May 14–17.

International Congress on Rheumatism—7th. New York, Boston, and Philadelphia. June 1–10.

Interstate Post-Graduate Medical Assembly. Cleveland, Ohio. October 13–19.

Iowa Public Health Association—14th Annual Meeting. Des Moines, Ia. April 30.

Maryland State Department of Health—20th Annual Health Conference, for field and departmental staffs. Baltimore, Md. May 3.

Michigan Public Health Association. Detroit, Mich. October 8–11.

Mother's Day. May 12. Tenth annual nation-wide campaign to make maternity safe—Maternity Center Association, New York.

National Association of County Officials. Houston, Tex. April 10–13.

National Association of Housing Officials. William Penn Hotel, Pittsburgh, Pa. May 15–17.

National Association of Purchasing Agents—Governmental Group. Cincinnati, Ohio. June 3–6.

National Biennial Nursing Convention. Bellevue-Stratford Hotel, Philadelphia, Pa. May 11–18.

National Conference of Social Work. Grand Rapids, Mich. May 26–June 1.

National Conference on State Parks. Starved Rock, Ill., and Spring Mill, Ind. May.

National Education Association. Milwaukee, Wis. June 30–July 4.

National Fire Protection Association. Atlantic City, N. J. May 8–11.

National Posture Week. May 6–11.

National Restaurant Association. Chicago, Ill. October 7–11.

National Safety Council. Chicago, Ill. October 7–11.

National Tuberculosis Association. Hotel Statler, Cleveland, Ohio. June 3–6.

Negro Health Week—26th Annual Observance. March 31–April 7.

New England Health Education Institute. Hartford, Conn. April 15–19.

New Mexico Public Health Association. Albuquerque, N. M. May.

New York State Association of Public Health Laboratories — 24th Annual Meeting. School of Medicine and Dentistry, University of Rochester, Rochester, N. Y. May 20.

New York State Conference of Mayors and Other Municipal Officials. Rochester, N. Y. June 3–7.

Northern Tri-State Medical Association. Battle Creek, Mich. April 9.

Office of Indian Affairs—Navajo Service. Tucson, Ariz. April 15–17.

Ohio Federation of Public Health Officials. Columbus, Ohio. May 24.

Pan American Sanitary Conference—Joint Session with Conference of State and Provincial Health Authorities of North America. Washington, D. C. May 8.

Pan American Union. Celebration of the Fiftieth Anniversary. Washington, D. C. April 14.

Pennsylvania Public Health Association. Philadelphia, Pa. May 23.

Public Health Association of New York City — Annual Meeting. George Washington Hotel, New York, N. Y. Section Meetings, 2:30 P.M., Dinner Meeting, 6:00 P.M.; April 9.

Smoke Prevention Association — 34th Annual Convention. Hotel Statler, St. Louis, Mo. May 21–24.

Society of American Bacteriologists. St. Louis, Mo. December.

South Carolina Public Health Association. Myrtle Beach, S. C. June.

Special Libraries Association. Claypool Hotel, Indianapolis, Ind. June 3–6.

Symposium on Clinical Experience in Nursing. Catholic University of America, Washington, D. C. June 26–27.

Texas Public Health Association. Fort Worth, Tex. Sept. 30–Oct. 2.

Tri-State Conference of Food and Health Officials. Pittsburgh, Pa. October.

Western Branch, American Public Health Association — 11th Annual Meeting. Denver, Colo. June 24–27.

American Journal of Public Health
and THE NATION'S HEALTH

Official Monthly Publication of the American Public Health Association

Volume 30 May, 1940 Number 5

CONTENTS

Continued on page vi

Contents of previous issues of the American Journal of Public Health and The Nation's Health can be found by consulting the Reader's Guide in your Library.

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Address correspondence regarding subscriptions, advertising, reprints, etc., to American Public Health Association, 374 Broadway, Albany, N. Y., or 50 W. 50th St., New York, N. Y.

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Contents—Continued

PAGE

Continued on page viii

Reprint prices furnished upon request

Contents—Continued

INDEX TO ADVERTISERS

American Journal of Public Health
and THE NATION'S HEALTH

Volume 30 May, 1940 Number 5

Dust Control in Rock Drilling*

LEONARD GREENBURG, M.D., F.A.P.H.A.,
THEODORE F. HATCH, WILLIAM J. BURKE, AND
WILLIAM B. HARRIS

Division of Industrial Hygiene, New York Department of Labor, New York, N. Y.

THE importance of silicosis as an occupational disease has been demonstrated in many industries. Such investigations have shown rock drilling in hard-rock mining and other drilling operations to be hazardous, even including open drilling in quarries, road construction, and building excavation. It is recognized, however, that the silicosis hazard among drill operators, as in other dusty operations, varies widely with the free silica content of the rock and with the degree to which the operation is confined.

Because of the extensive rock excavation work in New York State the control of silicosis among drillers and associated workers is regarded as a most important health problem. For this reason considerable effort has been directed toward its solution. An important step in this connection was the development of a code of dust control requirements for rock drilling.[1] Since it was to apply to all drilling operations, in rocks varying widely in their free silica content and with the degree of confinement, ranging from none to complete enclosure, it was essential that the requirements of the code be related properly to the varying silicosis hazard. This was done by providing two standards of permissible dust concentration, one for drilling in high silica rocks (Class II) and the other for operations in rock containing a low percentage of quartz (Class I), as follows:

Class of Rock	*Free Silica Content Per Cent*	*Max. allowable dust concentration, million per cu. ft.*
I	Less than 10	100
II	10 or greater *	10

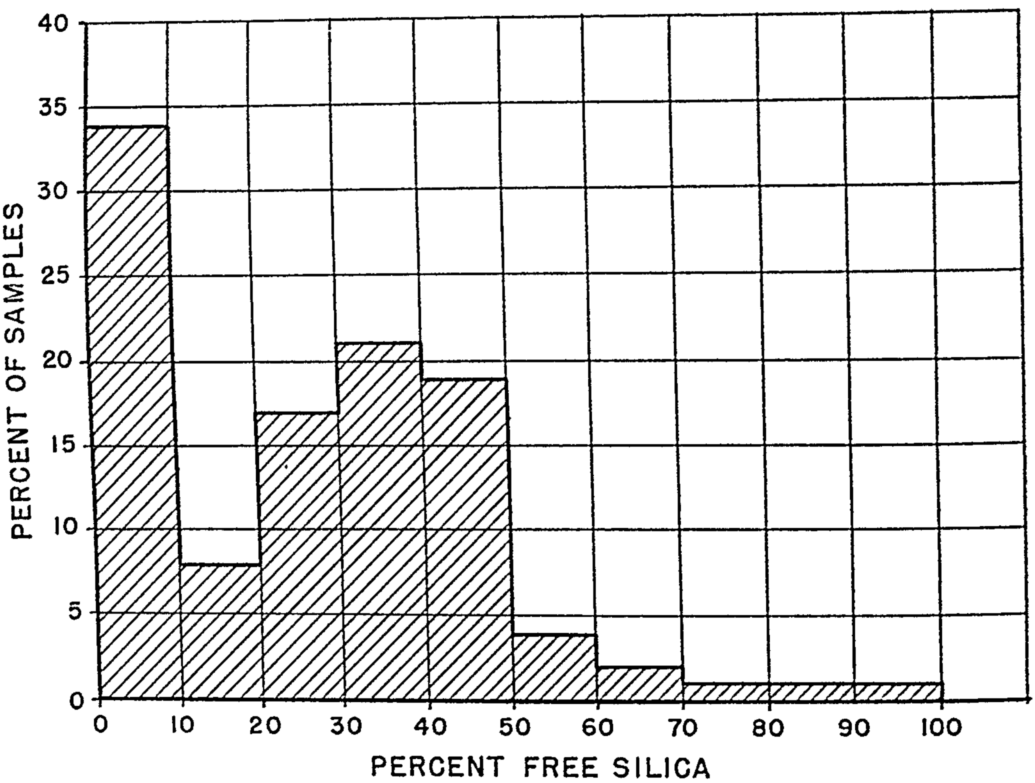
* Also rocks having a variable and unpredictable free silica content.

It will be observed that this limited classification departs from the generally assumed inverse relationship between the percentage of free silica and the permissible dust concentration,[2] in that only two standards are recognized rather than a sliding scale of permissible dustiness.

The use of only two standards simplifies the code, but a more fundamental

* Read before the Industrial Hygiene Section of the American Public Health Association at the Sixty-eighth Annual Meeting in Pittsburgh, Pa., October 20, 1939.

FIGURE 1—Distribution of rock samples according to the free silica content



reason for thus classifying rocks lies in the fact that the rock formations in New York State are naturally divided into two groups: (1) those moderately high in free silica or having a highly variable silica content, and (2) those having a free silica percentage below 10. This is shown in Figure 1 by the distribution according to quartz content of more than 600 rock samples collected throughout the state. One notes a reasonable separation of the samples into two groups with the dividing line between 10 and 20 per cent.

The two allowable dust concentrations of 10 and 100 million particles per cu. ft. also provide a reasonable basis for determining the dust control requirements in relation to the degree of confinement of the rock drilling operations. A concentration of 100 million is generally exceeded during uncontrolled dry drilling in underground areas. In the case of surface drilling, however, the concentration varies widely with direction and velocity of the wind, amount of protection at the drill, etc., and for certain operations, particularly

TABLE 1

Dust Concentration—Uncontrolled Open Drilling

Operation	*Type of Drill*	*Nature of Work*	*Dust Concentration, m.p.p.c.f.*		
			Min.	*Max.*	*Aver.* *
Building excavation	Sinker	Open	16	147	53
Building excavation	Sinker	Open cut	17	472	133
Building excavation	Wagon	Open	9	300	70
Building excavation	Wagon	Open cut	20	74	40 †
Quarry	Sinker	Open ledge	15	95	44
Quarry	Sinker	Block hole	1	178	51
Quarry	Wagon	Open ledge	4	132	28
Quarry	Drifter	Foot of the ledge	24	79	50

* These averages based upon number of tests in each case. More than 200 samples total.
† Low counts owing to wet rock.

in Class I rock, one may question the need for dust control. Dust concentration data for surface drilling under many different conditions [3] have been assembled in Table 1. The level of dustiness, it will be observed, is well above 10 million but generally below 100 million particles per cu. ft. Under the code, therefore, dust control means are required for all underground drilling operations regardless of the free silica content of the rock and for all surface drilling in Class II rock. The data show that unconfined dry drilling in Class I is permissible, however, without special control measures, since the average concentration does not reach 100 million particles per cu. ft.

ROCK SAMPLING AND ANALYSIS

It is clear from the foregoing that the proper classification of rocks from the various drilling operations constitutes an important part of the code administration, and because of the wide variation in the geological formations encountered special sampling technics are required. In one case, the operation may be confined to a single area of well defined composition whereas another may cover considerable territory within which the formations vary greatly. Every sampling procedure must therefore be outlined in advance to fit the local conditions in order to secure representative samples. Sampling methods employed by us are illustrated by the following:

Quarries — Stone quarries are frequently many acres in area with working faces as high as 200′ and may contain several different rock formations at various depths or in different sections of the quarry. In order to obtain representative samples, crushed rock is taken from the large storage piles which represent the accumulation of several months of operation and containing well mixed stone from all parts of the quarry. Grab samples are obtained from well distributed points by means of a clam shell bucket and the composite sample of about 2 tons is further mixed by raising and dropping the stone with the bucket. It is then quartered down to give a final sample of 35 lbs.[3]

Mines — Two or more samples are required from metal mines, one set representing the rock formations encountered in the development work and the other the ore being mined. In one case within our experience the development rock sample was taken from a waste dump containing about 100,000 tons which had accumulated over a period of years. This dump included materials of varying composition from different sections of the mine, and in devising the sampling procedure therefore consideration had to be given to the manner in which the waste rock pile had been formed. The rock was deposited on the dump in such a way that a horizontal section normal to the edge could be said to represent the dump as a whole. The sample was therefore taken from a series of equally spaced transverse trenches after stripping the weathered surface to a depth of 6 in. The sample of about 4 tons was crushed and quartered to give a final sample of 35 lbs.

The free silica content of the ore in this mine did not vary greatly, and a composite sample representing a week's production was therefore considered satisfactory. It was collected by an automatic sampler which removed from the main feed belt a handful of crushed ore at regular intervals.

Tunnels—In tunnel construction and general excavation work the broken rock is generally removed at once from the job and no opportunity is given to sample the material as a whole. Moreover, unlike mines, such operations are constantly moving ahead into new formations. Samples of rock are therefore taken from time to time as the work progresses, in order that we may be informed of the free silica content

of the rock throughout the duration of the job.

Analysis for Free Silica—In the laboratory the rock sample is ground to pass a 100 mesh screen and then thoroughly mixed to furnish the final sample for analysis. Knopf's procedure is followed in determining the free silica content. In the chemical analysis, however, the initial ignition is left out to avoid the danger of fusing certain constituents and rendering them relatively insoluble. A second portion is treated in the standard manner to determine total silica, after digestion in HCl, as in Knopf's technic.

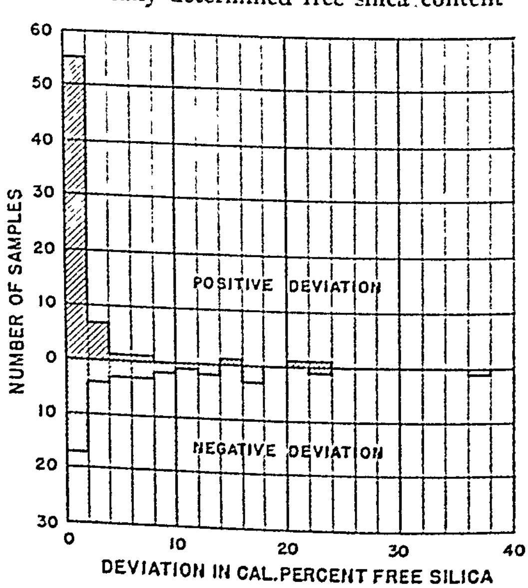
Knowing the total SiO_2 content, it is possible roughly to calculate the amount of free silica in the sample on the assumption that 50 per cent of the weight of the silicates is SiO_2 and that the material left after digestion in HCl includes only free silica and silicates. To illustrate: assume HCl — insoluble = 96.2 per cent and total silica = 66.7 per cent. The difference of 29.5 per cent represents the bases which were combined with an assumed equal amount of SiO_2 to form the silicates. Hence, the calculated free silica in the sample equals 66.7 — 29.5 or 37.2 per cent.

If the calculated and chemically determined results do not agree the sample is again studied by petrographic examination and even complete chemical analysis. There are several reasons for failure to secure agreement between the two results: (a) presence of HCl — insoluble constituents other than silicates and free silica such as insoluble oxides; (b) incorrect assumption of 50 per cent SiO_2, average, in the silicate as, for example, when feldspar is the principal silicate; (c) incomplete solution of the silicates in the hydrofluosilic acid* (d) loss of free silica by solution in the H_2SiF_6 owing to its fine particle size.

The approximate calculation is not offered as a basic procedure for determining free silica but it has been found however to provide a valuable check upon the uncertain action of the hydrofluosilicic acid and is presented for this reason. A tabulation of 104 rock analyses as depicted in Figure 2 shows that the calculated and chemically determined quantities of free silica agree within ± 2 per cent in 70 per cent of the cases with 87 per cent showing a deviation of not more than ± 5 per cent. For the most part, the very large negative deviations were associated with samples that failed to show definite endpoints for solution in H_2SiF_6. A large positive error suggests that the average SiO_2 content of the silicates present in the sample was greater than 50 per cent.

In addition to the problem of rock classification, another important technical phase of the code administration has to do with the evaluation of control measures designed to bring the dust concentration within the code requirements. In this connection, the control

FIGURE 2—Distribution of rock samples according to deviation calculated from chemically determined free silica content



* Among other silicates, talc has been found to dissolve very slowly in H_2SiF_6. We have not made use of fluoboric acid for which a more rapid solution of silicates is claimed.

problem with both dry and wet drills has been studied and the experience gained therefrom is summarized in the present paper.

DUST CONTROL WITH DRY DRILLING

The application of local exhaust ventilation to the dry rock drill provides a direct means for controlling the dust exposure of the drill operator. As with other dust exhaust systems, the apparatus required includes hoods at the drills, connected by flexible hose to a suitable source of suction and a dust collector. Unlike a permanent ventilating system in a factory, the exhaust system for rock drills must be compact and transportable to permit its being moved as the rock-drilling operations are shifted. The dust holding capacity of the collector must be sufficient to provide for at least 4 hrs. of continuous drilling at rates encountered in actual work. A highly efficient filter is required to allow for recirculation since the apparatus may be located in a confined area and the maximum filter resistance must be limited to prevent the rate of air flow from dropping dangerously between cleaning periods.

These requirements were incorporated in the procedure adopted for the testing of exhaust devices which may be briefly summarized as follows:

1. Tests to be conducted within an enclosure to eliminate the influence of natural air movement.
2. Overall rate of drilling during test: sinker, 15′ per hr.; wagon drill, 30′ per hr.; drifter, 20′ per hr.; stoper, 12′ per hr.
3. Test period: two tests of 3 hrs. each.
4. Rate of air flow through exhaust hood: at the rated capacity of the apparatus during one test and 25 per cent below the rated capacity during the other. The purpose of the test at the lower rate of flow is to demonstrate a reserve capacity for adverse operating conditions.
5. Filter resistance: The reduction in the rate of air flow during 3 hrs. of drilling, caused by the increased filter resistance, shall not exceed 15 per cent.
6. Dust storage capacity: a dust storage capacity is required for 4 hrs. of drilling, based upon the drilling rates specified above, and allowing for the increase in dust volume over the solid volume of rock removed by the drill.
7. Dust concentration: The dust concentration in the drilling enclosure and in the air discharged from the dust collector shall not exceed 10 million particles per cu. ft. during the test period.

Results of dust control studies—The results of the dust control tests in connection with dry drilling are summarized in Table 2. For the sinker and stoper satisfactory dust concentrations were

TABLE 2

Dust Concentration for Various Dry Drills with Exhaust Ventilation

Type of Drill	Rate of Drilling ft. per hr.	Air Flow Through Hood c.f.m.	Dust Concentration m.p.p.c.f. Range	Aver.
2⅝″ Sinker	16.6	40–50	2.3–28.0	14.4
" "	21.0	50–60	4.2–11.6	7.4
" "	16.4	60–70	2.4–4.4	3.0
" "	16.7	70–80	0.2–5.0	2.9
" "	19.7	90–100	2.4–6.2	4.6
2⅝″ Stoper	12.0	60–70	1.9–2.7	2.2
" "	9.7	70–80	1.1–1.7	1.4
" "	13.5	80–90	1.1–2.4	1.4
" "	17.8	90–100	2.3–4.0	3.2
3½″ Drifter	20.0	70–80	0.6–1.8	1.4
" "	24.0	80–90	1.8–1.9	1.9
" "	22.0	130–140	1.0–6.3	4.4
" "	28.0	160–170	1.8–3.9	2.7
4″ Wagon drill	34.0	170–180	0.35–1.5	1.0

TABLE 3

Filter Performance in Relation to Filtering Velocity

Drill	*Drilling Rate ft. per hr.*	*Eff. of Primary Separation*	*Filter Load at End of Test, lbs. per sq. ft.*	*Aver. Vel. of Filtration f.p.m.*	*Filter Resistance at End of Test*	*Decrease in Air Flow During Test Per cent*	*Dust Conc. in Filtered Air m.p.p.c.f.*
Sinker	17.5	98.0	0.14	3.6	2.6 in. Hg	—	12.3
"	16.3	97.5	0.24	3.1	1.5 " "	16	0.8
Drifter	24.0	96.5	0.31	2.9	1.5 " "	16.5	0.3
Stoper	13.5	97.0	0.19	2.8	1.0 " "	10.0	0.2
Sinker	21.0	96.0	0.45	2.7	2.0 " "	20.0 (variable)	0.5
Drifter	20.0	98.5	0.22	2.5	1.0 " "	15.0	0.2
Wagon	35.0	91.5	0.35	2.2	1.3 " "	15.0	0.4
Stoper	12.0	96.0	0.12	2.2	5.4 in. H_2O	5.0 (variable)	0.4
Wagon	33.0	93.0	—	1.95	4.0 " "	Negligible	—
Sinker	19.7	9 .5	0.19	1.8	3.5 " "	"	1.9
Drifter	28.0	93.3	0.16	1.6	2.5 " "	"	0.5
Sinker	16.0	95.6	0.15	1.4	0.75 " "	"	0.5
Drifter	22.0	94.5	0.12	1.3	1.0 " "	"	0.5

obtained with a rate of air flow of 60 c.f.m. or greater. Hence, the minimum rate air flow through the exhaust hood to allow for the reserve capacity required by the test procedure is 80 c.f.m. Higher rates of ventilation will, of course, provide a still greater factor of safety. Drifter tests gave acceptable dust concentrations at rates of air flow of 70–90 c.f.m. as well as at higher rates, but subsequent experience indicated that the air flow through the hood must be at higher rates to meet field conditions involving highly irregular rock surfaces and, as a consequence, the rated capacity of the dust collector for the large bore drills (3½″ and 4″) should be regarded as equivalent to two small bore drills. The tests with the 4″ bore wagon drill at rates of air flow through the hood of 170–180 c.f.m. gave satisfactory results.

Performance of Dust Collectors—The dust collectors employed with the rock drill exhaust systems tested included two or more stages of separation, the last stage in every case being a cloth filter. The performance data obtained during the testing of the various dust collectors are summarized in Table 3. The efficiency of primary separation averaged 96.5 per cent, ranging from 93.3 to 98.5 per cent. The velocity of filtration through the cloth filters tested varied from a high value of 3.6 f.p.m. down to 1.3 f.p.m. and the dust loading on the filter after 3 hrs. of drilling from 0.12 to 0.45 lbs. per sq. ft. of cloth. The dust concentration in the filtered air was satisfactory for all filtering velocities* and proved to be too high only at a filter resistance of 2.6″ Hg. The percentage reduction in air flow resulting from increased filter resistance was within the requirement of 15 per cent for a velocity of filtration of 2.5 f.p.m. or less, and a maximum filter resistance of approximately 1.0″ Hg. This is in agreement with the following theoretical calculations. Since resistance of the fixed part of the system varies directly with the square of the air flow rate, a reduction in air flow of 15 per cent decreases the resistance about 30 per cent. Thus, for a constant negative pressure at the fan inlet, the filter resistance will increase to approximately 1/3 of the total resistance when the air flow is reduced 15 per cent. The overall resistance of the dust collecting systems was found to be about 3.0″ Hg. Hence, the allowable maximum filter resistance is approximately 1.0″ Hg. It may be argued that such a resistance is contrary to good practice from the standpoint of

* This is in accordance with investigations which show that filter performance is independent of filtering velocity *per se*.

filter life, and also that it does not provide sufficient reserve capacity. It might be better to limit the filter resistance to, say, 6.0″ H_2O, in which case (assuming overall resistance of 3.0″ Hg.) the allowable reduction in air flow would be only 9 per cent during 3 hrs. of operation. One notes that for filtering velocities below 2.0 f.p.m., the filter resistance did not exceed 4.0″ H_2O and that there was no significant change in air flow, thus insuring constant performance and long filter life.

Dust Storage Capacity—The diameter of the drill hole commonly averages 2.0″. Hence, the volume of rock removed per ft. of depth is 0.02 cu. ft. The volume of the dust produced will be approximately double this figure, or 0.04 cu. ft. The required storage capacity for the four types of drills, operating for 4 hours at the rates specified above, will therefore be: sinker, 2.4 cu. ft.; stoper, 1.9 cu. ft.; drifter, 3.2 cu. ft.; wagon drill, 4.8 cu. ft. As a safety factor, extra storage is required and in general the storage space provided by the dust collector should be about 3.5 cu. ft. for the small drills (sinker and stoper) and 7.0 cu. ft. for the large drills (drifter and wagon drill).

Field Tests — Dust collectors have been used extensively on dry drilling operations for miscellaneous building excavation, road construction and similar work. Dust concentration data collected in the field are presented in Table 4 and for comparison, the concentrations without dust control on the same type of work are included. The reduction in dustiness is striking.

TABLE 4

Dust Concentrations for Dry Drilling with and without Exhaust Ventilation

	Average Dust Concentration			
	Without Exhaust Ventilation		With Exhaust Ventilation	
Type of Drill	Open	Open Cut	Open	Open Cut
Sinker	53.4	133.0	2.9	5.0 *
Wagon drill	70.4	40.0 †	1.0	

* Including counts contaminated by dust raised by nearby trucks

† *Drilling in wet rock*

DUST CONTROL WITH WET DRILLING

In comparison with uncontrolled dry drilling the wet drill greatly reduces dust production. The efficiency of dust control varies, however, with the design of the wet drill as indicated by investigations made on the Rand as early as 1916 [4] and more recently, by the U. S. Bureau of Mines.[5, 6] In connection with the development of regulations for the New York code, we also had the opportunity to study the dust producing characteristics of wet drills. The conclusions reached in the three investigations cited above are essentially alike and may be summarized as follows:

1. The dust concentration decreases with increasing water flow and with decreasing air flow through the drill steel.
2. Efficiency of dust control is least during collaring of the hole and increases with depth of hole.
3. Efficiency of dust control is greatest when drilling vertically down and decreases when the drill departs from this position.
4. The use of the wet drill alone, even one with the best dust control features does not provide complete dust control when operating in silicious rock in a confined area. Ventilation is required in addition to reduce the concentration below 10 million particles per cu. ft.

From the standpoint of drill design, Item 1 is of particular interest since the rates of water and air flow through the drill steel are subject to control by the drill designer. Their importance was recognized in South Africa many years ago and resulted in the development of the so-called "dustless" drill which permits little or no air flow through the drill steel and provides for a minimum rate of water flow of 1.5 g.p.m. Because of alleged inefficiency in removing cuttings from the drill hole its exclusive use for wet drilling was not recommended for the widely varying

TABLE 5

Rates of Water and Air Flow Through Wet Drills Used for Dust Control Study

			Air and Water Flow Through Drill Steel			
			Normal Operation		Collaring Speed	
Type of Drill	Number	Description of Drill	Air c.f.m.	Water g.p.m.	Air c.f.m.	Water g.p.m.
3½" Drifter	A-1	Standard drill with exhaust piped out of mine	9.86	0.58	14.1	0.48
"	A-2	Same as A-1 except exhaust free	5.5	0.55	10.3	0.55
"	A-3	A-1 with straight-through water connection	3.5	1.55	7.7	1.35
"	B-1	Standard drill, no modifications	2.3	1.20	5.2	0.37
"	B-2	B-1 with blowing port at collaring-speed plugged	2.3	1.20	1.03	1.20
"	B-3	B-1 with blowing port at collaring-speed plugged and straight-through water connection	1.87	1.88	1.0	1.90
"	B-4	B-1 with straight through water connection	1.67	1.88	3.3	1.82
"	B-5	Same as B-3 except 80 lbs. water pressure	1.6	2.28	0.8	2.24
2⅝" jack hammer	C-1	Standard drill	1.74	0.90	1.3	1.03
"	D-1	Standard drill	1.0	0.84	0.98	0.84

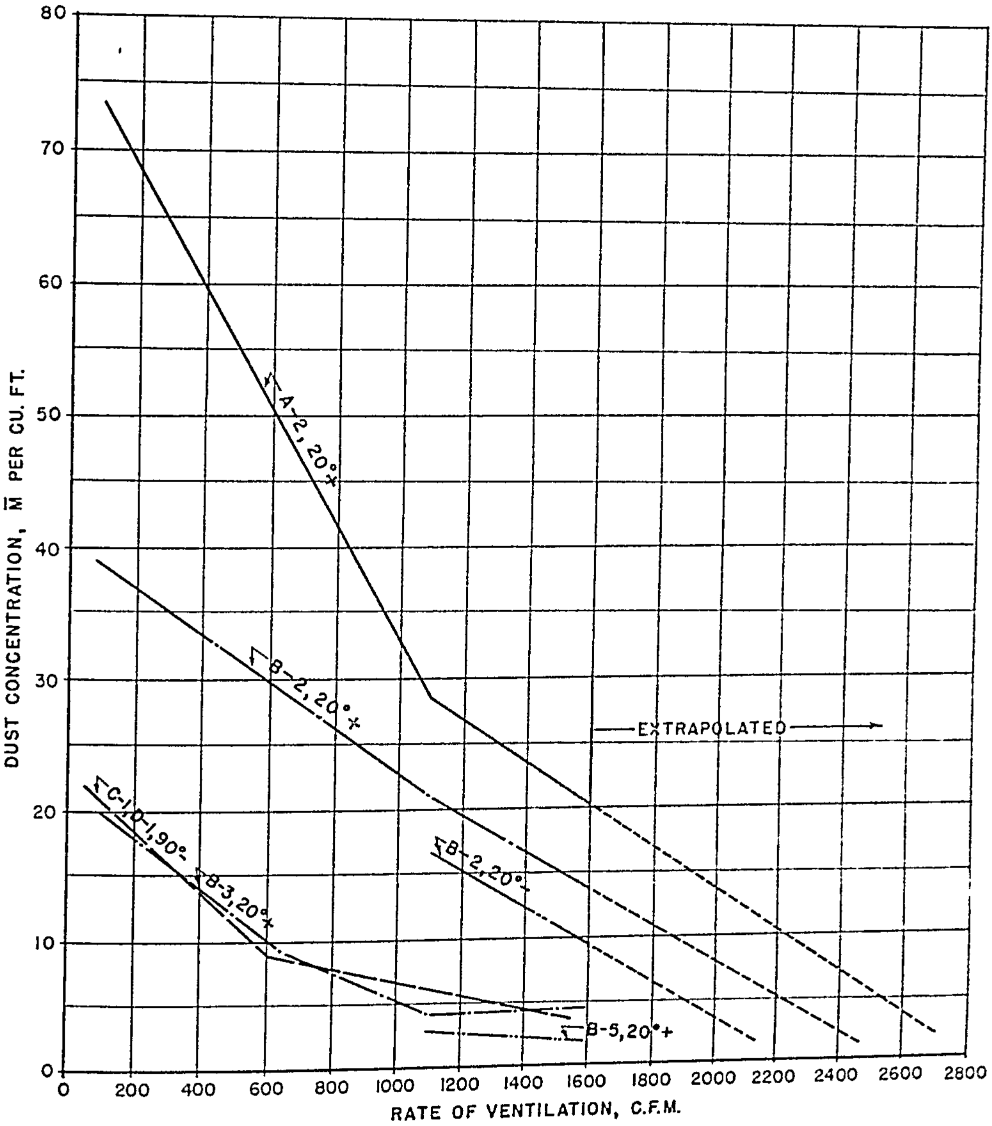
TABLE 6

Effect of Air and Water Flow Through Drill Steel and Rate of Ventilation Upon Efficiency of Dust Control in Wet Drilling

			Air and Water Flow Through Drill Steel				Drilling Speed			
			Normal Operation		Collaring Speed					
Number of Samples	Drill Number	Drill Position	Air c.f.m.	Water g.p.m.	Air c.f.m.	Water g.p.m.	Penetration in./min.	Over-all ft./hr.	Rate of Vent. c.f.m.*	Dust Conc. m.p.p.c.f.
				A-2, 20° above horizontal						
3	A-2	20°+	5.5	0.55	10.8	0.55	11.3	31.0	200	73.0
2	A-2	20°+	5.5	0.55	10.8	0.55	9.7	32.0	800	47.0
5	A-2	20°+	5.5	0.55	10.8	0.55	11.9	32.7	1,200	27.0
9	A-2	20°+	5.5	0.55	10.8	0.55	10.8	32.8	1,700	20.0
				B-2, 20° above horizontal						
4	B-2	20°+	2.3	1.2	5.2	1.20	14.8	38.1	180	39.0
2	B-2	20°+	2.3	1.2	5.2	1.20	13.1	35.0	1,180	21.0
2	B-2	20°+	2.3	1.2	5.2	1.20	14.6	43.0	1,680	14.0
				B-2, 20° below horizontal						
3	B-2	20°—	2.3	1.2	1.03	1.20	12.8	26.8	180	21.0
2	B-2	20°—	2.3	1.2	1.03	1.20	11.4	34.2	1,180	17.0
2	B-2	20°—	2.3	1.2	1.03	1.20	11.7	25.3	1,680	9.5
				B-3, 20° above horizontal						
3	B-3	20°+	1.87	1.88	1.0	1.90	12.6	23.5	180	20.0
2	B-3	20°+	1.87	1.88	1.0	1.90	14.3	39.0	730	9.2
2	B-3	20°+	1.87	1.88	1.0	1.90	11.2	—	1,180	4.2
4	B-3	20°+	1.87	1.88	1.0	1.90	12.4	30.0	1,680	4.6
2	B-3	20°—	1.87	1.88	1.0	1.90	10.3	31.0	1,680	9.5
				B-5, 20° above horizontal						
2	B-5	20°+	1.6	2.28	0.8	2.35	13.5	41.6	1,680	2.9
2	B-5	20°+	1.6	2.28	0.8	2.35	12.1	36.4	1,680	1.9
				Sinker — vertical						
3	C-1	90°—	1.74	0.90	1.30	1.03	4.5	16.7	100	22.0
2	D-1	90°—	1.00	0.85	0.98	0.84	5.7	23.5	550	9.0
2	D-1	90°—	1.00	0.85	0.98	0.84	5.9	17.9	1,500	3.8

* Including air discharged by the drill.

FIGURE 3—Relation between dust concentration and rate of ventilation for wet drills having different rates of air and water flow through the drill steel



operating conditions in New York. Instead, it was proposed to allow for the use of all modern types of drills properly classified into groups according to the rates of air and water flow through the drill steel and then to establish the minimum rates of ventilation required with each group in order to attain the specified dust control. Accordingly, our investigation was undertaken to establish this relationship.

Experimental — Eleven drills were used during the tests (listed in Table 5) which provided for a wide variation in the rates of water and air flow through the drill steel. The relation between the efficiency of dust control and the rates of air and water flow is shown for these drills in Table 6. A marked reduction in dustiness was obtained, it will be noted, by increasing the water flow and decreasing the air flow through the drill steel. In the case of drill B-3, for example, the dust concentration was found to be only 20 million as compared with 73 million for drill A-2 under the same operating conditions.

The beneficial effect of introducing clean air continuously into the drilling zone is also shown in Table 6 and in

Figure 3. Because of the limited capacity of the experimental fan the dilution was not sufficiently great to reduce the dust concentration in the drifter tests below 10 million except in the case of drills B–3 and B–5 which gave low rates of air flow (below 2 c.f.m.) and high rates of water flow (above 1.5 g.p.m.). For the less efficient* drills, the extrapolated curves indicate the rate of ventilation required for satisfactory dust control.

Wet Collaring—Collaring holes without turning on the water produces great quantities of dust for a short time and is not compatible with effective dust control since the rates of ventilation provided for above are not great enough to care for the extra dust load. The practice is, to a large extent, the result of habit and can be greatly reduced through education. It is a relatively simple matter however, to provide an automatic water valve on the drill which is operated by the air throttle and thus insure the immediate application of water as soon as the drill starts. The use of such combination air-water throttle has been required under the New York regulations, and all of the drill manufacturers have so equipped their drills.

TABLE 7

Classification of Wet Drills in Terms of Rates of Air and Water Flow Through Drill Steel and Ventilation Requirements for Effective Dust Control

		Air and Water Flow Through Drill Steel				
		Normal Operation		*Collaring Speed*		
Type of Drill	*Class of Drill*	*Air c.f.m.*	*Water g.p.m.*	*Air c.f.m.*	*Water g.p.m.*	*Minimum Rate of Ventilation for One Drill c.f.m.*
Drifter and	I	4–6	0.5 –0.75	5–12	0.5 –0.75	2,500
Wagon drill	II	2–4	0.75–1.5	2– 5	0.75–1.5	2,000
3½" and 4" bore maximum	III	0–2	1.5 and over	0– 2	1.5 and over	1,200
Sinker 2⅝" bore, maximum	—	2.0, max.	0.75, min.	1.0, max.	1.75, min.	500

A consideration of these data led to the classification in Table 7 for drifters, wagon drills, and sinkers with respect to their rates of air and water flow and to the accompanying ventilation requirements. For drifter mounted drills, groups I and II include practically all machines that were commercially available prior to these tests, whereas, to meet the requirements of Group III, certain drills had to be modified, as for example, by enlarging the bore of water tubes, reducing clearances between moving parts and eliminating certain air passages through the drill which allowed excessive air flow into the chuck chamber. Thus, while no limitation has been put on the use of old types of wet drills, great emphasis has been placed upon their poor characteristics with respect to dust control.

* Efficiency of dust control.

APPLICATION OF VENTILATION WITH WET DRILLING

The dust concentration developed during wet drilling, even in a confined space, does not generally reach 100 million, and no mechanical ventilation is required for dust control in conjunction with wet drills operating in Class I rock. Furthermore, in the case of open drilling, the ventilation established by natural air movement is usually sufficient to reduce the dust concentration associated with wet drills below 10 million particles per cu. ft. Hence, the

need for mechanical ventilation in connection with wet drilling is practically limited to operations in Class II rock in underground or other confined areas. The manner of introducing the required ventilation will vary from one job to another and is governed by consideration of other functions of the ventilating system in addition to dust control during drilling, such as removal of natural and blasting gases, dust control during mucking, control of fog, and the maintenance of comfortable working conditions. The ventilation problem in a mine with numerous drifts, raises and other drilling areas is quite different from the problem in a tunnel having only two headings. The ventilation system is much more complicated in mines than in tunnels but in the latter, work is carried on with greater intensity and progresses at a greater rate so that the ventilating system must be extended regularly. As an example of the ventilation problem in connection with underground wet drilling, the experience gained in the construction of the Delaware Aqueduct has been summarized below.

Three methods of tunnel ventilation are available, all of which have been employed successfully for dust control on the Aqueduct.*

1. Blowing outside air toward the face from a vent pipe which extends back to a blower fan mounted on the surface. The end of the vent pipe must be kept close enough to the face to insure an effective circulation of air through the drilling zone. A modification of this system consists in direct blowing from a main vent pipe terminating beyond its effective distance from the face and providing in addition an auxiliary exhaust system to draw air direct from the face and discharge it into the tunnel at such a point that the two streams do not mix.

2. Exhausting air direct from the face and conveying it through the vent pipe to the surface. In a modification of this, the main exhaust pipe may terminate back from the face with an auxiliary blower used to pick up clean incoming air in the tunnel and discharge it across the face.

3. Exhausting air from the face and discharging it immediately through a suitable air-cleaning apparatus for recirculation in the heading. The recirculating system provides no general tunnel ventilation and consequently a primary system for this purpose is required in addition.

Ventilation by Direct Blowing — In the case of direct blowing, which is the simplest kind of ventilating system, the dust concentration obtained at the face depends upon three factors: the rate of ventilation in relation to the number of drills in use, the distance from the vent pipe to the face, and the degree to which the face is obstructed by platforms and other parts of the drill carriage. The number of drills in use on the Aqueduct varies from 5 to 9, and the rate of ventilation from 10,000 to 14,000 c.f.m., thus providing a ventilating rate per drill in excess of the minimum of 1,200 c.f.m. for Class III drills. The rough tunnel diameter varies from 26′ to 17′ approximately, and the vent pipe is either 26″ or 28″ diameter, thus giving an outlet velocity of approximately 2,500 f.p.m.

The relation between the dust concentration and the distance from the vent pipe to the face is shown for simple blowing in Table 8 and in Figure 4. According to these data, the dust concentration is reduced below 10 million when the vent pipe is terminated at a distance less than 100′ from the face.* This is not to be considered as a general recommendation. For other tunnel sizes, number of drills, and other difference in operating condition, the maximum permissible distance may be more or less than 100′.

* The present discussion has to do only with the problem of dust control during drilling and does not consider the other functions of tunnel ventilation which may be of greater importance in determining the method of ventilation to be used.

* No correction was made in these data for the dust concentration in the incoming air which probably averaged 2 million.

The problem of insuring effective circulation across the face with direct blowing is complicated by the fact that the operating platforms on the drill carriage are brought as close as possible to the rock face as a safety measure. The use of open grille platforms, while insuring the desired air movement across the face, has not been highly successful from the standpoint of maintenance. Best results have been obtained by locating the vent pipe at the spring line of the tunnel rather than at the crown, so that the circulation at the face is in a horizontal direction and is therefore not obstructed by the horizontal platforms.

TABLE 8

Dust Control by Wet Drilling Plus Ventilation by Direct Blowing

Dust Conc. in Relation to Distance of Vent Pipe from Heading

Rate of Ventilation = 1,500 to 2,000 c.f.m. per Drill

Distance of Vent Pipe from Face	*Dust Concentration, m.p.p.c.f.* Range	*Mdn.*
50– 59	5– 7	6.0
60– 69	4–10	8.0
70– 79	11–15	11.0
80– 89	6–11	8.0
90– 99	4–14	7.0
100–109		
110–119	5–16	8.0
120–129	6–18	12.0
130–139	8–20	11.5
140–149		
150–159	6–27	8.0
160–169		
170–179	13–20	17.5
180–189	16–84	24.0
190–199	6– 8	7.0
200–209		10.0
>209	11–30	17.0

Some doubt has been expressed as to the practicability of bringing the vent pipe as close as 100′ from the face, owing to the possible damage from flying rock during blasting. Little or no trouble has been experienced in this connection, but in certain sections of the Aqueduct an auxiliary exhaust fan is mounted on the drill carriage which discharges through flexible vent tube to a point approximately 75′ from the face and diametrically opposite the main vent pipe. The effect of this is to insure active ventilation at the face when the end of the vent pipe is more than 100′ away. As shown in Table 9, the use of the auxiliary system produces satisfactory dust control when the main vent pipe is as much as 150′ from the face.

TABLE 9

Dust Control by Wet Drilling Plus Ventilation by Blowing and Auxiliary Exhaust Ventilation

Dust Conc. in Relation to Distance of Vent Pipe from Heading

Rate of Primary Ventilation = 1,500 to 2,000 c.f.m. per Drill

Rate of Auxiliary Ventilation = 1,500 to 2,000 c.f.m. per Drill

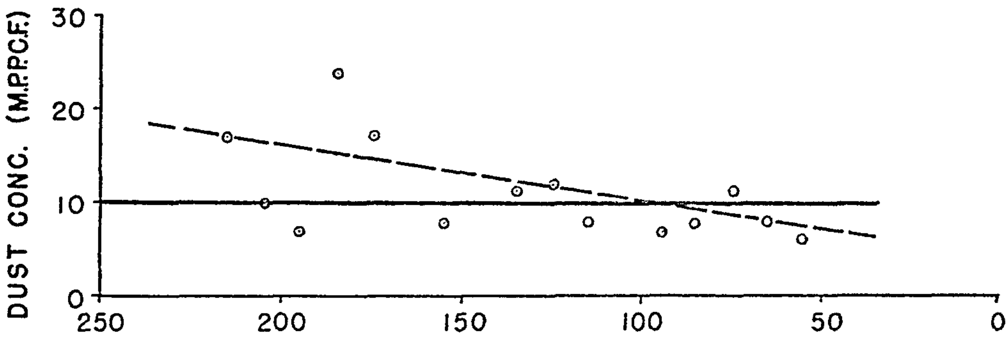
Distance of Vent Pipe from Face ft.	*Dust Concentration, m.p.p.c.f.* Range	*Mdn.*
70– 79	9–11	10.0
90– 99	5–13	8.5
100–109	11–13	12.0
120–129	7–15	9.0
140–149	7–14	10.0
150–159	5–10	7.0
200–209	12–14	14.0

Ventilation by direct blowing forces the air from the face back through the tunnel and hence carries all of the dust released by the drills with it. It is evident, however, that the dust concentration will be highest at the face since the reduction in dustiness is brought about by dilution. The average dust concentration in the general tunnel air with direct blowing was found to be 5 million particles per cu. ft. with a maximum of 6 million.*

Ventilation by Recirculation—The use of air-cleaning equipment in conjunction with exhaust ventilation at the face to allow for the immediate recircu-

* In one section through dry shale, enormous dust concentrations are produced by blasting. This dust gathers in the vent pipe during the period of exhausting following the blast and is returned to the tunnel air when the fan is reversed to blowing, particularly during cold weather when the air delivered underground is dry. Continuous exhaust ventilation is therefore employed to avoid general contamination of the tunnel air.

FIGURE 4—Relation between dust concentration in heading and distance of vent pipe from the face. Ventilation by direct blowing.



lation of the ventilating air is employed on several sections of the Aqueduct. The apparatus, which is installed on the drill carriage, includes one or two exhaust inlets at the front end of the drill carriage connected in one case to a Rotoclone, followed by filters treated to withstand moisture. The function of the Rotoclone is twofold: it serves as an exhaust fan and also precipitates water droplets and some of the dust from the incoming air so as to decrease the load on the filters and thus increase their life. Another recirculating apparatus employed consists simply in a disc fan connected to suitable inlets and discharging through a 4 mesh screen.

The air-cleaning efficiency of the recirculating equipment as well as the rate of air flow must be high enough to reduce the dust concentration in the working area to the required level.

Dust concentrations obtained through the use of the recirculating equipment are given in Table 10. It is interesting to note that when filters are used, the rate of ventilation per drill through the recirculating apparatus may be lower than that required with direct blowing. This is explained by the fact that direct exhaust from the face permits more effective use of the ventilating air: that is, all of the air travels across the face whereas in direct blowing with the vent pipe as much as 100′ from the face, some of the ventilating air does not even reach the drilling zone. The efficiency of air cleaning in the simpler recirculating apparatus is not as high as that provided by the Rotoclone and filter and for this reason a higher rate of ventilation is required per drill for effective dust control. Dust is apparently removed with the fog droplets which collect on the wire screen and are also thrown out by the fan itself. The apparatus is simple and inexpensive to construct and operate.

TABLE 10

Dust Control by Wet Drilling and Recirculating Ventilation

Distance Vent. Pipe from Face ft.	*Primary Vent. Cap. c.f.m.*	*Recirculating Vent. Cap.*	*No. Drills*	*Dust Conc. Range*	*Dust Conc. Mdn.*	*Remarks*
150	5,000	4,000	5	3–6	4	[illegible]
170	6,000	4,000	5	9–13	10	[illegible]
170	12,000	6,000	6	13–14	14	[illegible]
50-150	10,000 *	10,000	6	3–10	[illegible]	[illegible]

* Primary ventilation by blowing or exhausting

SUMMARY

The silicosis hazard is well recognized among rock drill operators working in hard-rock containing a high percentage of free silica. It is regarded as an important industrial health problem in New York State, with its extensive rock excavation operations. Control of the hazard is provided for through a rock drilling code which requires that dust concentrations be reduced to 100 million and 10 million particles per cu. ft. for operations in rocks containing less than and greater than 10 per cent free silica, respectively. Certain technical problems in connection with the administration of this code are considered in the present paper, including the sampling and classification of rocks, the dust control requirements for dry drilling and the drill design and ventilation requirements for use with wet drills, as illustrated by the experience gained in the construction of the Delaware Aqueduct.

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Automatic Control of Pasteurization Advantages and Safeguards*

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MILK pastuerizers may be classified into two broad categories. The most common is the manual vat type into which the raw milk is received cold or partially heated, then heated in the vat to the pasteurization temperature, held at or above that temperature for the required 30 minutes or longer, after which the outlet valve is opened manually to discharge the milk to the cooler and thence to the bottler. The second type is the automatic or continuous-flow pasteurizer into which the milk is received already heated to the pasteurization temperature and is held automatically for the required length of time before it is automatically discharged to the cooler and thence to the bottler. The two types of pasteurization differ from each other in much the same way as the custom-manufacture of automobiles in the "horse and buggy days" differed from the continuous-flow assembly line of the modern mass-production plant.

Automatic or continuous-flow systems may employ three different types of holders for automatically holding the milk for the required length of time. One type consists of a battery of vats equipped with power-operated inlet and outlet valves the opening and closing of which are regulated by an automatic timing mechanism. After the milk is heated to slightly above the pasteurization temperature in the thermostatically controlled heater, it enters the vat whose inlet valve happens to be open. This inlet valve remains open for a predetermined period and, just before it closes, the inlet valve of the second vat opens to permit filling of the latter. This procedure continues until all vats in the battery have been filled, after which the cycle begins anew. In the meanwhile, however, the outlet valve on the first vat has opened automatically to discharge the vat contents, 30 minutes after the first inlet valve had closed. The outlet valves on the other vats follow a similar timing. The result is that during operation one vat is being filled and one vat is being emptied while the remaining vats of the battery are at different stages of holding.

Another design of automatic holder is the pocket type, which consists of a tank partitioned off into a number of separate pockets. The cycle of filling, holding, and emptying the pockets is similar to that of a battery of vats. However, pocket type holders are usually equipped with a common inlet-valve mechanism and a common outlet-valve mechanism instead of individual inlet and outlet valves on each pocket. In some designs, indeed, both the inlet and outlet valves are integral in one assembly, and either the valve or the holder revolves at a predetermined speed to complete the cycle. Filling or emptying or both may be accomplished in both pocket holders and in a battery of vats by suction or compressed air.

A third design of automatic holder consists of a tubular or equivalent stream-flow section through which the milk flows continuously during normal

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* Read at a Joint Session of the Health Officers and Engineering Sections of the American Public Health Association at the Sixty-eighth Annual Meeting in Pittsburgh, Pa., October 20, 1939.

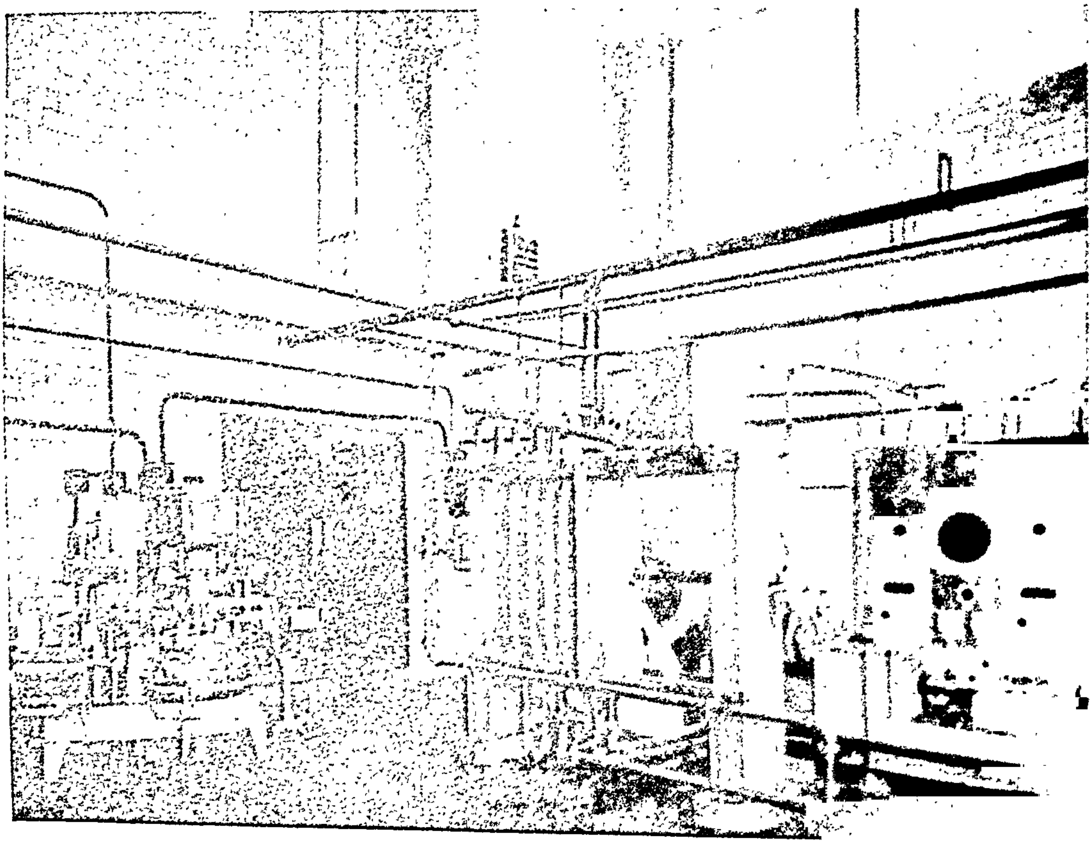


FIGURE 1—Short-time high-temperature pasteurizer

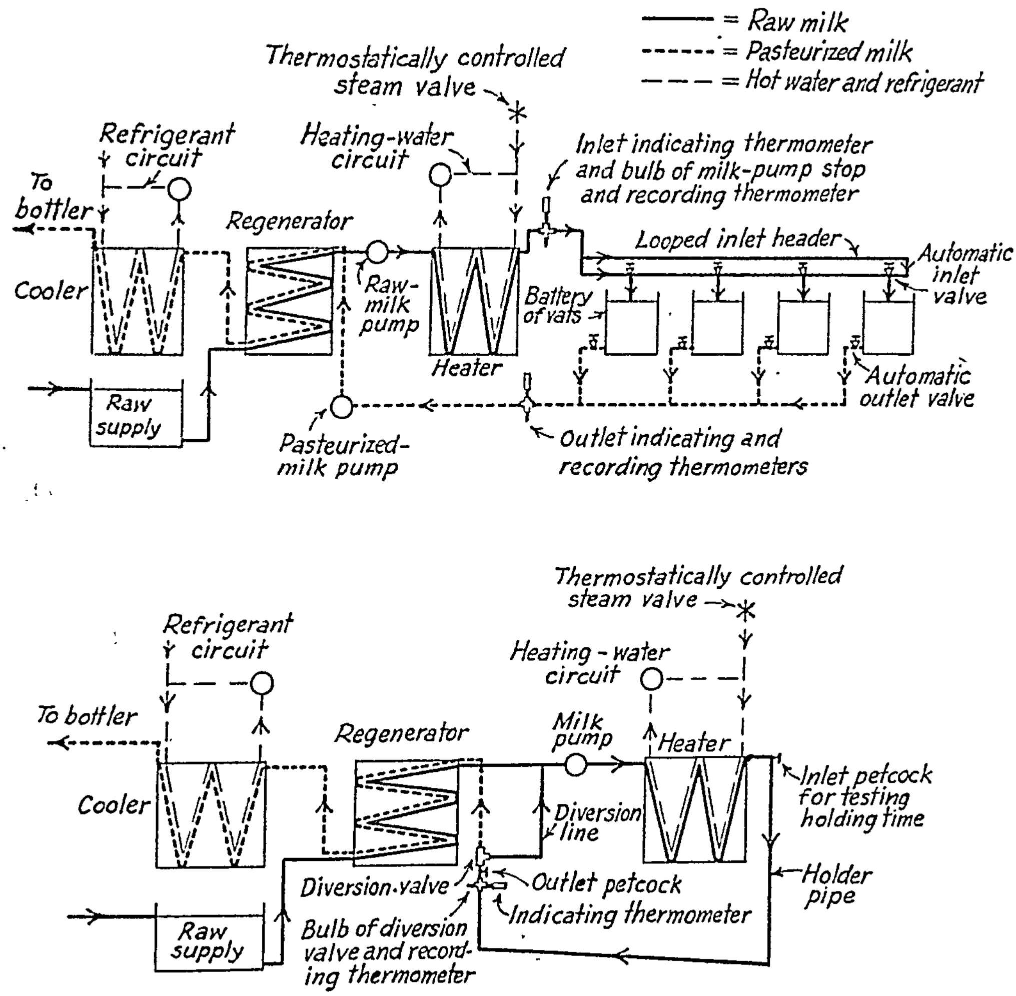
operation. In this design the speed of the milk pump is so set that the shortest time in which any particle of milk can traverse the holding section is greater than the required holding period. As in the other automatic types, the milk is heated to above the pasteurization temperature before entering the holding section. The tubular holder is generally employed in high-temperature short-time pasteurization; and while it is still being used in one model of 30 minute pasteurizer, further production of this model has been discontinued (Figure 1).

Automatic pasteurization equipment is coming into more general use in the larger milk plants because of its greater economy in space, labor, and the amount of equipment requiring cleaning. This economy is particularly noticeable in the case of high-temperature short-time pasteurizers. When a milk plant's business reaches the capacity of its building it is faced with the alternatives of erecting costly additions or of substituting automatic equipment in place of existing vat-type pasteurizers. An example of this was observed in one plant which installed high-temperature short-time equipment of greater capacity but occupying less than one-fourth the floor space of the original equipment.

Another advantage of automatic equipment from the operator's viewpoint is the ability to employ regenerators, or heat exchangers, in which a continuous flow of hot pasteurized milk on one side of a metal partition warms the incoming cold raw milk on the other side, with a substantial saving in both heating and refrigeration costs. Since efficient heat exchange requires a continuous flow of milk in both directions, manual pasteurization does not readily lend itself to regeneration.

Prior to the recent development of

FIGURE 2—Flow diagrams for battery of 30 minute automatic pasteurizers, and for high-temperature short-time pasteurizer (Diagrammatic Elevation)



the phosphatase test for determining the efficiency of pasteurization, the manual vat pasteurizer was generally believed to give more reliable results than the automatic types. This opinion was based on the fact that in the case of manual vat pasteurization it is within the power of the operator to raise the milk temperature in the vat or to prolong the holding period, if necessary, thus assuring adequate pasteurization at all times and under all conditions. Automatic pasteurization, on the other hand, was considered to be subject to the frailties of automatic devices, which sometimes broke down, thus permitting improperly pasteurized milk to flow forward to the cooler and the bottler before the operator could apply corrective measures.

Experience with the phosphatase test during the past two years has proved the fallacy of this opinion and has indicated the superior reliability of automatic over manual pasteurization. In Chicago, for example, the health authorities were astonished to find that the phosphatase test revealed frequent instances of under-pasteurization from manual equipment but only rarely from automatic equipment. We must conclude that while the safeguards that have been incorporated in automatic pasteurizers are still imperfect, they have been recently improved so as to eliminate many of their weaknesses;

but that, on the other hand, the faults inherent in the human element of manual pasteurization are still present.

While the phosphatase test is of great value as a check of the pasteurization process, it cannot replace plant inspection but can only supplement the latter. The phosphatase test is based on the inactivation by heat of the enzyme phosphatase which is naturally present in fresh milk. It will not indicate all under-pasteurization, nor whether the defect is under-pasteurization in temperature, under-pasteurization in time, or the addition of raw milk. Nevertheless, it frequently offers the health officer a clue which enables him to search for fraudulent practices and errors in design and operation which might otherwise have remained undetected. It has been valuable, too, in focusing attention on the need for trained operators of pasteurization equipment.

From the health officer's point of view the important question is: "What safeguards of design and operation must be required to insure proper pasteurization in automatic equipment?" The answer may be found in the *Milk Ordinance and Code* recommended by the Public Health Service. Because a comprehensive answer would be highly technical and too lengthy for a limited paper, only the high lights will be presented.

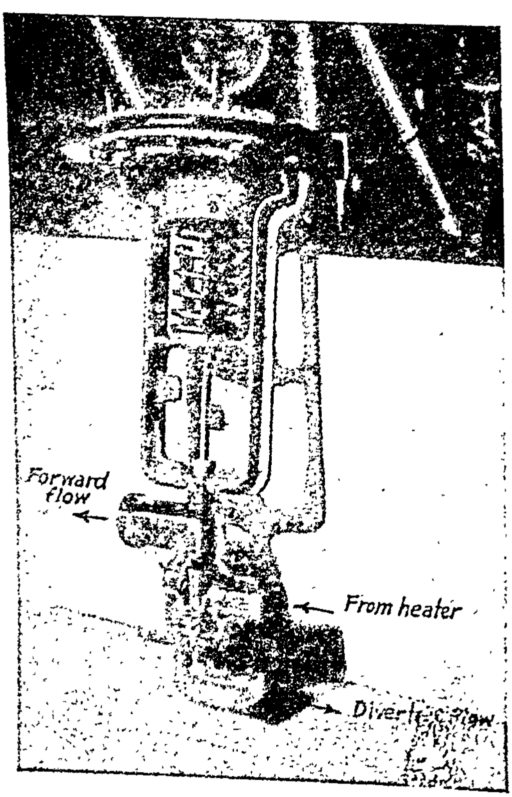


FIGURE 3—Flow-diversion valve

The safeguards necessary naturally fall into two classes—those designed to insure proper temperature, and those designed to insure the required holding time. In equipment from which milk is discharged automatically it is obvious that unless the milk has entered the holder at pasteurization temperature, and has been held for the full holding period, it may be discharged without being adequately pasteurized. Since large volumes may be involved, the operator would hesitate to repasteurize such milk even if the danger were discovered in time. It is therefore necessary to make such equipment as completely automatic as possible.

Automatic temperature control involves several fundamental factors. The first is accurate indicating thermometers for use during pasteurization, and accurate recording thermometers to furnish a history of the temperature between inspections. The second is a dependable thermostatic control of the milk heater to insure automatic heating to at least the required temperature. As the thermostat may occasionally get out of order or the heat source may fail, an automatic milk-flow stop is necessary to stop the forward flow of sub-temperature milk.

There are two types of automatic milk-flow stops, namely, pump stops and diversion valves. A milk-pump stop automatically shuts off the milk-pump motor whenever the milk temperature falls below the pasteurization temperature, and automatically starts the pump

when the milk again reaches that temperature. A flow-diversion valve automatically diverts the milk back to the heater whenever its temperature is too low, and automatically reëstablishes forward flow when the pasteurization temperature is again reached.

Milk-flow stops must meet certain specifications if they are to be reliable. They must be adjusted to cut in and cut out the flow of milk at the required temperature, and the proper setting should be sealed so that it cannot be lowered without the inspector's knowledge. The routine operating temperature should be sufficiently above the setting of the milk-flow stop so that the latter will not be brought into frequent operation, since with each cut-out a surge of sub-temperature milk continues its forward flow for a few seconds, even though the speed of response to milk temperature changes is as rapid as can be practicably required. Obviously, too, it should be impossible to bypass any milk around the milk-flow stop, as otherwise its purpose is defeated. The bulbs of the indicating and recording thermometers should be located as near as practicable to the bulb of the milk-flow stop so that all may react to the same temperature.

These specifications apply to both types of flow stops. In the case of milk-pump stops the following additional precautions are advisable: (1) the stop bulb should be located at some point in the milk within the influence of a heating medium, as otherwise the milk pump could not be restarted; (2) manual switches should be prohibited for milk-pump stops because they can be operated manually to establish forward flow of milk regardless of its temperature; (3) all forward gravity flow of sub-temperature milk during pump shut-downs must be prevented. In the case of flow-diversion valves special requirements are necessary to prevent sub-temperature milk from entering the forward-flow line due (1) to failure to assume the diverting position when the primary motivating power fails, or (2) to the omission or jarring loose of the clip connecting the valve seat and the actuating mechanism, or (3) to tightening the stem packing so tightly as to prevent the valve from assuming the fully diverting position, or (4) to the absence of a properly designed leak escape to prevent leakage past the seat from entering the forward-flow line during diversion, or (5) to incomplete closing of the forward-flow seat so that leakage past it exceeds the capacity of the leak-escape device.

In the case of 30 minute holders the milk-flow stop is usually located upstream from the holder, and either a pump stop or a diversion valve may be used. For 15 second pasteurizers, however, a flow-diversion valve is ordinarily employed at the downstream end of the holder section. The location of the stop and the type of stop used are governed by specifications designed automatically to safeguard the pasteurization temperature throughout the entire holding period.

When a milk-flow stop is used only upstream from the holder, various precautions should be taken to prevent any significant loss in milk temperature downstream from the stop bulb. The holder must be either insulated or equipped with automatic auxiliary heaters, and the milk must be kept mixed, so that no particle thereof will cool significantly during the holding period. Temperature loss in the milk line between the stop bulb and the holders may be avoided by providing a continuous flow in all parts thereof during operation and automatic drainage when forward flow ceases. Means should also be provided to prevent the hot milk entering the holder after a lengthy shut-down from being cooled by the cooled holder contents or metal; and to prevent the milk that may have cooled

after discharge from the holder from returning to the holder and thus cooling the incoming hot milk.

When a milk-flow stop is located only downstream from the holder, the safeguards are of a different character. The holder system must be unheated, as otherwise milk entering at sub-pasteurization temperature might thereafter be raised to the proper temperature and thus be passed by the downstream flow stop without having been held at that temperature throughout the required holding period. As no heating medium can therefore be available to start the milk pump, such a stop cannot be of the pump-stop type, but must be of the diversion type. In addition, sufficient mixing of the milk in the holder must be provided so that no portion of it is significantly colder than the remainder, as a small volume of sub-temperature milk could be passed by the flow stop, due to its thermometric lag, before it responded.

We have discussed temperature safeguards. In automatic systems the holding time must also be safeguarded. Naturally, no milk should be added to any vat or pocket after the beginning of any holding period. Pocket type holders should be so constructed that milk from one pocket cannot overflow into any other pocket, as otherwise it may be discharged from the holder without having been held for the required time. Unless tubular holders are equipped with an air vent, they should be so sloped that no air or gases can accumulate at a high point in the holder section, thereby decreasing the cross-sectional area of flow and increasing the velocity of flow so as to reduce the holding time. In the case of 30 minute tubular holders special precautions are necessary to insure the full holding time, but these will not be discussed in this paper. The maximum attainable speed of the motor and of driving gears which operate the timing device of automatic batch holders, and the speed of the milk pump in the case of tubular holders, must be such as to insure adequate holding time. If the speed is variable the proper setting of the motor governor or the drive should be officially sealed so that the holding time cannot be shortened without the inspector's knowledge.

Tests of the holding time are necessary upon installation and after any alteration that may affect the detention period. In the case of automatic vat or pocket systems the interval between the closing of the inlet valve and the opening of the outlet valve may be checked with a watch. In the case of tubular holders the holding time is determined by injecting a dye solution into a petcock located at the inlet to the holder section and accurately observing the time required for the color to appear at the outlet end.

When regenerators are employed, the raw milk must be kept at a lower pressure than the pasteurized milk (or the heat-transfer medium, as the case may be) not only during normal operation but also at the beginning of a run and during pump shut-downs. Unless the proper relative pressures are maintained the raw milk may contaminate the pasteurized product in case flaws develop in the metal or the joints seperating the two. The methods of insuring proper relative pressures cannot be discussed within the scope of this paper, but may be found in publications of the United States Public Health Service.

Brief as this outline has necessarily been, it will perhaps have served the purpose of emphasizing the highly technical nature of automatic pasteurization equipment, and the advisability of appointing milk plant inspectors who have sufficient engineering or equivalent technical training for the proper performance of their duties.

Evaluation of Cancer Control Methodology*

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THE program for cancer control in Massachusetts began as a new venture to be molded by experience and evaluated by results. Essentially it embodies the stimulation of conscious knowledge of the disease and its implications among the profession and the populace, and the supplementation of existing diagnostic and therapeutic resources. It has been tempered to a degree of sensitivity to existing needs, and has maintained its pliability for the accommodation of progressive change. The incorporation of corrections and the omissions of proved inadequacies, as revealed in the analysis of the periodic studies of each of its parts, have been the instruments in the tempering process, and the facts in this report may be considered the guides.

The sources of factual information on which the periodic checks have been based are the death rates; attendance of cancer patients at state aided cancer clinics; periods of delay between first symptoms and first visit to physician, clinic, and treatment; attendance of physicians at teaching clinics; use made by surgeons of the Tumor Diagnosis Service; and the prognosis at clinic admission. Trends from these data are shown in Table 1. The age adjusted female cancer death rate has fallen; the male rate appears stationary; the admission rate to cancer clinics has nearly tripled; the percentage of those with favorable cancer has slightly decreased; the number of physicians attending teaching clinics has increased steadily; the number of physicians sending specimens to the diagnostic service has doubled; and there has been an increase in the number of individuals going to physicians and clinics, and receiving treatment in the early stages of the disease. All these measurements point toward improvement in the program for cancer control, with the exception of the item listed as "percentage of favorable cases" which has a downward trend. All of these trends merit detailed analysis.

The age adjusted cancer death rates for males and females furnish one index of the status of the cancer problem. This index is retroactive, a more accurate picture of an earlier period in view of the 2 year lag which is created by the duration of the disease. From an administrative standpoint this is unfortunate because it necessitates delay if changes are necessary. The amenability to treatment of cancers of the breast and the uterus accounts in part for the greater improvement in the age adjusted cancer death rates among females than

* Read before the Vital Statistics Section of the American Public Health Association at the Sixty-eighth Annual Meeting in Pittsburgh, Pa., October 17, 1939.

TABLE 1

Trends of the Several Criteria of Evaluation of Cancer Control Methodology

	Average 1927–33	1934	1935	1936	1937	1938
Female cancer death rate per 100,000 population, adjusted to age	127.7	129.4	125.2	124.9	124.5	124.2
Male cancer rate per 100,000 population, adjusted, to age	95.5	107.2	99.2	105.9	102.8	106.7
Admission rate per 100,000 population of cancer patients at state aided cancer clinics	15.8	24.3	24.8	29.7	30.8	38.2
Attendance of physicians at teaching clinics	....	190	422	843	1,384	1,796
Number of surgeons using Tumor Diagnosis Service	388	513	562	610	650	702
Percentage of cancer patients going to first physician within 1 month of first symptoms	14.7	15.6	16.6	14.7	17.4	19.7
Percentage of cancer patients going to first physician within 4 months of first symptoms	44.2	45.5	45.7	50.0	48.9	50.2
Percentage of cancer patients going to clinic within 1 month of first symptoms	4.3	6.2	6.1	5.0	5.1	5.5
Percentage of cancer patients going to clinic within 4 months of first symptoms	28.3	31.4	32.9	36.5	34.8	35.1
Percentage of cancer patients receiving treatment within 1 month of first symptoms	2.9	3.3	4.0	3.1	3.0	3.4
Percentage of cancer patients receiving treatment within 4 months of first symptoms	19.6	20.4	25.2	25.9	25.5	26.5
Percentage favorable cases	39.5*	41.2	39.6	33.0	37.5	36.5

* 3 year average

among males.[1] Since 1934, when the high point of 129.4 per 100,000 population was reached among females, there has been a consistent decline in their rates. Among males, the age adjusted death rate, while still increasing, appears to be approaching a level.

The number of admissions to the state aided cancer clinics has increased progressively. The full import of this observation lies in its relationship to the amount of cancer morbidity at any moment. Among the better estimates of cancer morbidity are those of Bigelow and Lombard for Massachusetts,[2] and of Mountin, Dorn, and Boone for Atlanta, Ga.[3] These estimates are entirely different as probably are the two localities in respect to cancer. Correct reporting of cancer morbidity would be ideal, but has been proved to be impracticable in Massachusetts by Curtis and Bigelow who experimented with the idea on a voluntary basis in Newton.[4] Without a satisfactory estimate of the size of the problem, the attendance at the clinics cannot be perfectly appraised. If the death trend and morbidity trend for cancer are somewhat similar, however, the increased clinic attendance means an improvement in the situation.

The Tumor Diagnosis Service has been operating since before the inception of the complete cancer control program. Its use by surgeons is a specific index of their increasing consciousness of the possibility of cancer among their patients, and also has proved to be a mark of the effectiveness of the educational methods employed throughout the state. As rapidly as a community is organized into the Coöperative Cancer Control Program, the number of specimens suspected of malignancy from the surgeons in that community to the Tumor Diagnosis Service begins to increase.

The increased attendance of the general practitioner at the teaching clinics is another indication of a progressive attitude among the profession toward cancer.

In analyzing the trends of favorable cases and delay it is necessary to compare these data with end results, as the cases called favorable cases are opinions at best, and whether or not an interval of delay occurred between the first visit to a physician and attendance at the

clinic has no effect as a rule on either delaying or hastening the institution of therapy.

Follow-up over a long period of time is prerequisite to accurate appraisal in the study of cancer methodology since the end results of cancer cannot be obtained until years after the onset of the original lesion. New lines of therapy frequently replace original treatment during the interval. The inherent difficulties in the actual processes of long-term follow-up occasion the loss of some valuable objective research material. In culling the literature on the subject, the difficulty of comparison with reports of other authors is evident because of the infinite variety of populations upon which purported cures are based. Some are limited to favorable cases, others to favorable and operable cases, and a few are not limited but include a cross-section of all cases. Another difficulty is introduced in the criterion of measurement of favorable or operable cases among individual surgeons. Surgeons with equal operative ability may show significant differences in 5 year cures according to the particular standard of measurement employed in each case.

Not only the criterion of measurement but the actual period of measurement varied in the literature; some have used 3 years without recurrence of symptoms, others 10 years, and the great majority 5 years. Such so-called cures are far from satisfactory, as disease may be present and unrecognized at the time of examination. The British Ministry of Health [5] has used a survival rate calculating the number of years which followed operation. This is a more satisfactory statistical entity as the fact of being alive may be determined beyond question whereas there is always some uncertainty as to the actuality of cure.

The records collected from the Massachusetts state aided cancer clinics * are far more complete in respect to follow-up than most other cancer data. From the inception of the cancer clinics in 1927 through 1938, there were 11,032 individuals with cancer who came to the clinics. Of this number, 9,006 were individuals with primary cancer or cancer with metastases. Only 2.3 per cent of the clinic patients have been lost, giving a 97.7 per cent successful follow-up. The criterion of measurement used is similar to that employed by the British Ministry of Health,[5] the principal difference between the two being the point at which measurement was started. The Massachusetts data use as an origin the appearance at the state aided cancer clinic, not the moment at which treatment was instituted. This is a very slight difference because over four-fifths of those attending the Massachusetts state aided cancer clinics have treatment within 1 month.

Neither the 5 year cure nor a survival period is an accurate picture of a real cancer cure. The age of the cancer patient is such that mortality from other

* At the first visit of the patient to a cancer clinic, information is obtained by social service regarding the symptoms and their duration, the motivating cause for coming to the clinic, identifying data, age, sex, whether other doctors had been consulted, the interval since onset of symptoms that had elapsed prior to first consultation with a physician, and the interval between first consultation with a physician and consultation at clinic, and reasons for delay in seeking diagnosis. One of the physicians in charge of the clinic dictates the medical findings and the recommendations. The patient is returned to his physician and treatment is determined by this physician, and effected in some cases with and in some cases without the assistance of social service in making arrangements. The social worker follows each cancer patient, obtains hospital transcripts of operations and other therapy, and keeps in touch with the patient throughout life. If the patient moves, the record is continued by the worker in the section of the new residence. If the patient leaves the state, attempts are made to contact him through existing agencies. The majority of lost patients are those who have left the state and with whom it is impossible to establish a local contact. All these records are verified, coded, punched, and tabulated by experienced workers under the supervision of the co-author, who revised the earlier code and directed the transfer to codes of the data on the clinic forms. The procedures were not as well standardized in the early years of the cancer clinics, and the percentage of unknown items was greater than in the later years.

diseases is high and many individuals do not live a sufficient length of time to determine whether or not they have been cured of their cancer. As a check on whether the survival rate can be used as a reasonably satisfactory measure of cure, a table was constructed of the cancer clinic population from 1927 to 1937 inclusive. The percentage of cancer individuals dying each year following the clinic visit, both with cancer and without cancer, as well as the expected percentage of deaths other than cancer in the Massachusetts population starting at age 61 was computed. The mortality rates for the cancer population for those dying within 1 year of clinic admission were based on the median of 11 years, and for each subsequent year on 1 year less. On this basis, only the clinic admissions of 1 year, 1927, could have survived 11 years at this writing. Curiously enough, the percentage remaining alive at the end of 11 years was identical with what would be expected by subtracting the total death rate from 100. This indicates a similarity of the death rates year by year, and gives additional weight to the results.

The number who died with no cancer present has been reasonably consistent throughout the period. The highest rate is 2.1 and the lowest 0.4. This last figure, based on only one clinic year's experience, is naturally not so well established. Moreover, the percentage dying each year from noncancer is less than a similar percentage constructed from the Massachusetts death tables. After 4 years the cancer death rate is below 2 per cent, and while there is a general lessening as the years progress the figures indicate that cancer patients who survive 4 years have a relatively low cancer death rate.

A survival rate of over 4 years is justified by this evidence as a relative determinant of curability. In dealing with end results in relation to the percentage of favorable cases and the various periods of delay, the clinic cancer population between 1927 and 1933 inclusive has been used. There were 1,333 individuals of the total 3,795 who attended the clinic in this period alive in July, 1938. The shortest period of survival was 4.5 years, the longest 11.5, with an average of 7.2 and a median of 6.7. For convenience, all the records of one year are centered on the midpoint. The status of cancer patients for the first 7 years as of July, 1938, is shown in Table 3.

TABLE 2

Percentage of Cancer Patients Dying at Varying Intervals After Admission to Cancer Clinics, Contrasted with Non-cancer Deaths in Massachusetts

	Mortality Rate per 100 Cancer Patients Attending State-aided Cancer Clinics, 1927–37			
Dying Within:	*Total*	*Cancer Present at Time of Death*	*No Cancer Present at Time of Death*	*Expected Deaths from Diseases Other than Cancer per 100 Population in Massachusetts Starting at Age 61 (Computed from 1931–33 Deaths)*
1st year	29.7	28.3	1.4	2.2
2nd year	11.4	10.0	1.4	2.4
3rd year	6.9	5.8	1.1	2.4
4th year	4.2	2.3	1.9	2.6
5th year	3.8	1.9	1.9	2.7
6th year	3.6	1.9	1.7	2.9
7th year	3.6	1.5	2.1	2.9
8th year	3.0	1.3	1.7	3.0
9th year	2.5	0.8	1.7	3.1
10th year	2.1	0.3	1.8	3.4
11th year	1.3	0.9	0.4	3.5
Total dead at 11 years	72.1	55.0	17.1	
Alive at 11 years	27.9			
Grand Total	100.0			

TABLE 3

Status as of July, 1938, of Cancer Patients in Attendance at Massachusetts State Aided Cancer Clinics, 1927–1933

Years After Clinic Admission	*Living*	*Dead*	*Unknown*	*Total*
11	67	173	6	246
10	143	290	22	455
9	126	295	30	451
8	180	342	22	544
7	195	365	23	583
6	273	428	11	712
5	349	430	25	804
Total	1,333	2,323	139	3,795

The physician indicates whether or not in his opinion a clinic patient may be cured under the item "favorable case." An increase in the percentage of favorable cases would show an increased attendance of patients with early cancers of curable sites. If the judgment of physicians and the sites of cancer were constant, the term "favorable case" would measure actual progress or retrogression. The variability in these two items makes this index of fluctuating significance.

A perusal of the records shows that the percentage of cancers of accessible sites has varied considerably over the period studied. In the later years there has been an increase in the clinics in the number of inaccessible cancers, with a resultant decrease in the percentage that could be considered favorable. Table 4 demonstrates the increased percentage of individuals with cancer of the digestive and respiratory tracts, where the percentage of cures is low. This shows that the program is reaching

TABLE 4

Increase in Percentage of Individuals with Cancer of the Digestive and Respiratory Tracts

Massachusetts State Aided Cancer Clinics

Year	*Per cent*
1927–1933 Average	12.1
1934	13.0
1935	16.6
1936	17.1
1937	17.4
1938	18.7

a greater cross-section of cancer patients. It also stresses the inherent difficulty in anticipating a favorable prognosis.

The prognostic ability of the clinic physicians has been determined by comparing the original prognosis with 4 year end results, in order to determine the presence or absence of a trend. It was impossible to obtain a larger series due to the fact that this information was not available for the early years. The 1931 prognosis was correct in 72.5 per cent of the cases; the 1934 prognosis in 76.8 per cent. This indicates a slight improvement in prognosis.

TABLE 5

Percentage Agreement of Prognosis with End Results

Massachusetts State Aided Cancer Clinics

Year	*Per cent*
1931	72.5
1932	75.9
1933	75.1
1934	76.8

The shortening interval of delay in each of its several aspects is one of the signs of progressive improvement. The responsibility for these several delays falls on the individual alone in one case, on the individual and his physician in the second case, and on the individual, the physician, and the clinic social worker in the third case. The patient himself is responsible for the length of time he delays seeking medical advice after he notices an abnormality. The patient and physician are responsible for that second interval after the visit to the physician before the attendance at the clinic. Since the individuals studied are all clinic patients, and since social service is required in every clinic, the responsibility for delayed treatment following clinic diagnosis must be shared by the social worker.

Of the 3,795 cancer patients who came to the clinics between 1927 and 1933, the percentage of unknown items varied in the different periods of delay.

The intervals of delay have been computed solely on known data (Table 6).

TABLE 6

Percentage of Unknown Items of Delay Among Individuals with Cancer in Attendance at Massachusetts State Aided Cancer Clinics, 1927–1933

Unknown as to duration between first symptom and first visit to physician	13.1
Unknown as to duration between first visit to physician and first visit to clinic	6.6
Unknown as to interval between first visit to clinic and institution of therapy	5.3
Unknown as to interval between first visit to physician and first visit to clinic	18.3

Physicians were consulted within the first month of symptoms by 14.7 per cent of the clinic patients with cancer who went to physicians prior to attendance at the clinics. About two-fifths of these same patients went to the clinic within 1 month of first visit to physician and about four-fifths of this number had treatment within 1 month of clinic consultation. Only 2.9 per cent of the cancer individuals had treatment within 1 month of first symptoms. Of this group 50.5 per cent were alive from 4.5 to 11.5 years (Table 7). The other periods of delay are not as sound an index of accomplishment since the survival rates of these groups are similar to that of total cases. If skin cases are omitted, this percentage of 50.5 would be reduced to 44.5.

TABLE 7

Survival Rates Subdivided by Periods of Delay of Individuals with Cancer in Attendance at Massachusetts State Aided Cancer Clinics, 1927–1933

	Per cent Alive
Less than 1 month delay between first symptom and first visit to physician	26.2 ± 4.0
Less than 1 month delay between first visit to physician and attendance at clinic	38.2 ± 1.4
Less than 1 month delay between first visit to clinic and institution of treatment	37.8 ± 0.9
Less than 1 month delay between first symptom and institution of treatment	50.5 ± 5.1
Total Cases	36.7 ± 0.9

A further tabulation has been done showing the percentage living by sites of cancer for those treated within 1 month of recognizable symptoms compared with those who were treated later. The results are consistently lower with the exception of cancer of the digestive tract, but chance fluctuations are so large that significance is found only in uterus and totals (Table 8).

Information is available on the reason for delay before coming to clinic of 6,933 of the 9,006 cancer individuals who attended the clinic from 1927 to 1938 inclusive. The delay in most cases is a summation of the delay before visit to first physician and between this period and attendance at clinic. A small part of the population had only the delay before clinic consultation as the first physician seen was at the clinic. The reasons for delay are given in Table 9.

TABLE 8

Survival Rates, by Sites of Cancer, of Individuals with Cancer in Attendance at Massachusetts State Aided Cancer Clinics, 1927–1933

	Per cent Living Total	*Per cent Living Patients Who Were Treated Within 1 Month of Recognizable Symptoms*	*Per cent Living Coming After Delay of Over 1 Month for Treatment*
Buccal	36.6 ± 1.9	41.2 ± 11.7	36.5 ± 2.0
Digestive Tract	5.0 ± 1.2	0.0 ± 7.3	5.2 ± 1.2
Uterus	23.6 ± 2.2	62.5 ± 10.6	21.8 ± 2.3
Breast	28.8 ± 2.1	44.0 ± 9.1	28.0 ± 2.1
Skin	57.6 ± 1.5	76.5 ± 12.0	57.5 ± 1.5
All Others	25.6 ± 2.5	80.0 ± 19.5	24.5 ± 2.4
Total	36.7 ± 0.9	50.5 ± 5.1	36.3 ± 0.9

TABLE 9

Reason for Delay Before Coming to Clinic of Individuals with Cancer in Attendance at Massachusetts State Aided Cancer Clinics, 1927–1938

	Per cent Total Cancer Population	*Per cent Patients Who Delayed*
No Delay	15.9	
Physician Advised Otherwise	21.6	25.6
Fear	2.5	2.8
Negligence and Ignorance	53.6	63.9
Economics	2.5	3.0
Miscellaneous	3.9	4.7

The large percentage of individuals who delay due to negligence emphasizes the need for further education of the public. In the group which received other advice from a physician are two types of patients—those who could be helped and those who in the opinion of their physicians were so far advanced that other than palliative treatment would be useless. Of the group that could be helped, some were delayed by physicians who made mistaken diagnoses and others by those who prescribed treatment of a dubious nature. There are no data available to separate the 21.6 per cent into these component parts. In a study of a random sample of cases in the Memorial Hospital in New York and the Lendrim Tumor Clinic in the Paterson General Hospital in New Jersey, Pack and Gallo [6] divided the responsibility for delay into three groups: patient alone, patient and physician, physician alone. They attributed 17.0 per cent to physician alone, and 18.0 per cent to physician and patient. In this study no attempt was made to make a combined classification of physician and patient, so the 21.6 per cent of this study would correspond to 35.0 per cent of their study. Moreover, they used a 3 month interval as no delay, while in the present study delay was considered as longer than 1 month. They found 20.7 per cent of their cases marked no delay contrasted with 15.9 in this study. Considering the criterion of delay used in Massachusetts and the resultant figures, it would appear that the manifest interest of the Massachusetts physicians, over half of whom are in constant contact with the Cancer Division, is apparent in these figures. It is difficult to understand why even so small a percentage as 2.5 delayed for economic reasons. Inasmuch as diagnosis is available without cost for those of limited means, the only explanation would appear to be a lack of knowledge of the availability of clinic resources. Even transportation is provided, if the individual cannot obtain it otherwise.

The period of delay between the visit to clinic and the institution of treatment has been studied in relation to the cause for delay. Here the number of unknowns is much less—7.9 per cent. The close supervision of the patients by social service is responsible for this low figure. The reasons for delay for the 8,294 individuals with information available are shown in Table 10.

TABLE 10

Reason for Delay Between Diagnosis and Treatment of Individuals with Cancer in Attendance at Massachusetts State Aided Cancer Clinics, 1927–1938

	Per cent Total Cancer Population	*Per cent Patients Who Delayed*
No Delay	64.3	
Physician Advised Otherwise	1.1	3.1
Fear	1.6	4.5
Unwilling to Accept Diagnosis	2.8	7.8
Economics	0.8	2.3
Physical Condition	2.7	7.6
Negligence	2.6	7.3
Waiting for Arrangement	21.7	60.7
Miscellaneous	2.4	6.7

The largest item deals with waiting for arrangements. Inasmuch as delay between clinic and treatment was defined as any period over 7 days, this high percentage does not seem unreasonable. In many cases individuals had to wait longer than this before they could be admitted to a hospital. A great many of the patients made use of the state cancer hospital which has a wait-

ing list practically all the time. The waiting list is so arranged that individuals with a strong probability of cure are usually admitted within a week, while some of the others wait for a longer period of time.

The items "no delay" and "physician advised otherwise" are exceedingly satisfactory when comparison is made with these same items in a study reported by Lombard and Cronin in 1929 on the earlier experience of the clinics.[7] At that time only 41.7 per cent experienced "no delay" as compared with 64.3 per cent in this study, and 11.8 per cent were "advised otherwise by physicians" as compared with 1.1 per cent in this study. One very important finding disclosed by this study is that the later manifestations of the disease are more conducive to action than are the early symptoms, and that education on this score must continue without abatement. Of individuals who went to their physicians within 1 month of their symptoms, 24.8 per cent went to the clinic almost immediately. Of individuals who delayed between 6 months and 1 year before consulting a physician, 44.8 per cent went to the clinic almost immediately. Of those individuals who delayed 1 year and longer 64.5 per cent went to the clinic immediately after consulting their physician.

Theoretically, the best method for determining the progress of the cancer control program in Massachusetts lies in the percentage of individuals having cancer in attendance at the state aided clinics who have received treatment within 1 month of symptoms. Until more early cases appear at the clinics, this figure cannot be used exclusively. At the present time it is better to use a combination of several items to measure this progress than to limit measurement to any single item.

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DISCUSSION

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TO most public health audiences, cancer is a relatively new subject. Moreover there are few major public health problems, efforts in the control of which are viewed with a more general and widespread feeling of hopelessness than cancer.

The subject is new to public health because of the limitation of its interests in the past to such traditional problems as maternal and child welfare and the infectious and communicable diseases. The feeling of helplessness in regard to a solution of the problem arises first because sufficient knowledge of fundamental causes is not available, and

second because most attempts to summarize existing knowledge into a broad philosophy of cancer encounter so many inconsistencies among the alleged facts as to create the impression that the problem is profoundly complex.

This impression as to the extreme complexity of the problem is gained from the fact that, in most particulars, cancer is a disease unto itself; that it has no counterpart anywhere in the field of medicine and public health; that it is practically universal in its occurrence; that it affects peoples of all races and social classes, both sexes, and at every age; that it involves practically every organ and tissue of not only man but lower animals; that, indeed, in many particulars, it is strikingly similar to certain abnormal conditions affecting even plant life.

Clinically, cancer is a condition characterized by an unrestricted growth of tissue, the fundamental and ultimate cause or causes of which are unknown. In this unrestricted and unlimited growth, the cancer cell, so far as can be determined, appears to be outside of range of effective influence of the physiological growth-inhibiting functions of the host organism. Generally speaking, unless destroyed by artificial means, this growth is continuous, limited only by the extent to which its nutritional requirements are met, and ceasing only with the death of the host.

However, this capacity for continued unrestrained growth is the only characteristic common to the large group of conditions we speak of as cancer. Only in its universality of occurrence and in the " immortality " of its cells is cancer a single entity.

In all other respects, *i.e.*, from the standpoint of its epidemiology, etiology (broadest sense), therapy, end results, economics, amenability to diagnosis and treatment, and administrative aspects of facilities required for its prevention and control, cancer is not a single disease, but embraces a very wide variety of conditions, indeed almost as many as there are body organs and tissues which it attacks. For example, carcinoma of the cervix and carcinoma of the lung differ in these respects as widely as gonorrhea in the female differs from pulmonary tuberculosis; carcinoma of the breast is hardly more closely related epidemiologically to carcinoma of the skin than Brill's disease to Rocky Mountain spotted fever.

Therefore it seems important to emphasize the multiple character of cancer, the full appreciation of which, in my judgment, is basic and fundamental to a reasonably sound concept of the disease and of the problem.

The present evolution of our thinking in cancer is in many respects parallel to that in relation to fevers a half century or more ago. Seventy-five years ago, the most ingenious theories and hypotheses were developed in an attempt to reconcile the then known facts about fevers into a broad philosophy of the fever problem and to devise some practicable measures for their control. This ingenuity was necessary by reason of the fact that no distinction was then made between such conditions as typhus, typhoid, the bacillary dysenteries, malaria, and perhaps others. It was not until these differentiations were made, *i.e.*, the fever problem broken down into its simpler elements, that really workable hypotheses could be advanced and something done in a constructive way toward " fever control."

Similarly the cancer problem when broken down into its many components becomes much less formidable. Because a great deal is known about cancer of certain anatomical sites and generally speaking those forms which are most prevalent are, fortunately, most amenable to prevention and control.

It is significant that cancer is receiv-

ing increasing attention by official health agencies, though not yet in a degree corresponding to its importance to the public health. This discussion of Miss Macdonald's indicates not only that something is being done about the problem in Massachusetts in an organized and systematic way, but also—and what is more important perhaps—notwithstanding the complexities of the data involved, a program of cancer control, to a surprising degree, is amenable to critical and intelligent appraisal, and indeed susceptible of a more critical analysis than is ordinarily applied to programs directed against our traditional public health problems.

It is hardly necessary to emphasize here that this appraisal was possible only through the application of statistical technics to clinical data. It is significant that heretofore the interests of the public health statistician and the epidemiologist for the most part have been limited to the infectious and communicable diseases. These diseases have mass manifestations such as attack rates, and rates of occurrence in relation to exposure, contact, age, sex, color, and usually only a limited number of environmental conditions, for all of which specially adaptable statistical procedures, through experience, have been reasonably well developed and standardized.

With the major shift in emphasis in public health over to such problems as cancer, heart disease, diabetes, mental health and rheumatism, additional technics will be necessary: first because of their chronicity, and the introduction of the time factor into practically every item of consideration, life-table procedure will undoubtedly find increasing application; second, because here, the data necessary for study and consideration are to a much greater extent clinical, and in the case of cancer, they must come from the clinician, surgeon, and radiologist, a group which traditionally is neither familiar nor particularly sympathetic with the statistical approach to medical problems.

Massachusetts is a pioneer state in cancer control. The past 10 years of experience give it not only an opportunity but a responsibility for leadership in stimulating within the professions generally, and in public health circles especially, an interest in and respect for critically technical appraisals of organized schemes directed to the control of the next great group of public health problems namely, chronic disease.

Integrating Industrial Hygiene with Local Health Service*

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INDUSTRIAL hygiene has developed in the United States during recent years at a rate not heretofore experienced. Few public health activities have enjoyed more spectacular growth in a short period of time than has this program for conserving the health of industrial workers. The reasons for this rapid development need not be reviewed here, but it is felt that they are of sufficient soundness to insure the continued advancement of this phase of public health. It is gratifying to observe that the physical welfare of the industrial worker is finally receiving the attention which has been merited for many years. Workers who have pioneered in this phase of public health service must be pleased to see industrial hygiene incorporated as a legitimate function in so many of the state and municipal departments of health.

Indisputable evidence has been presented to show that the physical status of a large proportion of the gainfully employed is less favorable than that of the population as a whole. It is also true that many of the factors responsible for these unfavorable health experiences in industry are amenable to control through public health efforts. There is little doubt, therefore, that with the continued development of preventive medicine, industrial hygiene will enjoy further growth, and it is predicted that the time soon will come when it will be included as a definite activity in the health service of every area having industrial health problems.

These recent developments in the field of industrial hygiene have had a somewhat revolutionary influence upon the scope of activities covered by the service. The term industrial hygiene has been given a somewhat broader definition, and stripped of some of its highly specialized meaning in the minds of many health officials. This service formerly was regarded as a rather ultra-scientific field of endeavor dedicated to the control of specific occupational disease hazards. During recent years the program has been given a less exclusive and more understandable meaning.

In addition to research and special studies, industrial hygiene may now be interpreted as dealing with less specific conditions which may also be found in any community. The scope of the service, as now conceived, is so broad as to run the whole gamut of preventive medicine from the study and control of silicosis to antityphoid inoculations of industrial workers. In other words, the

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trial hygiene problems in the state. Consequently, any type of local coöperation which is worthy of the confidence that would be placed in it would be a beneficial "substation" or "transformer" through which the limited services that state organizations could render would be transmitted to the intended beneficiaries of the service.

By way of illustrating how such a local engineer would coöperate with state officials in an industrial hygiene program, two examples are given. First, let it be presumed that a special investigation is to be made of the lead hazard in the printing industry. The specific studies involved in this investigation would be made by the state industrial hygiene workers through and in coöperation with the local health officials. The local engineer would participate in these investigations, thereby being able to increase his knowledge of the problem and its control. Subsequent to the studies certain follow-up investigations would be indicated for the purpose of assisting local plant officials in correcting unsatisfactory conditions revealed by the study. He would also be able to observe general environmental conditions in the plants periodically to note progress in control efforts. It might be desirable to collect dust samples from time to time for subsequent check-up on plant operations. The plant officials would be likely to want information on certain questions, and it would be advantageous to themselves as well as the local health department if they could get this information locally without having to wait several days for the information to come from the state workers.

The second example of how a local engineer can render effective industrial hygiene service can be applied to a preliminary investigation of a local request for service. For example, a plant official desires assistance in determining whether a particular manufacturing process is hazardous to the health of the workers. The natural procedure for him to follow would be to call on the local health department for aid. The engineer would visit the plant and obtain specific information concerning the problem. In some cases, possibly he would collect air samples, knowing that past studies had shown that certain threshold limits for safety had been determined for the materials involved. If the services of the state industrial hygiene workers were indicated he would supply valuable advance information concerning the probable hazard, the materials used, and the type of investigations which would seem indicated. This service would better enable the state workers to visit the local plant properly equipped to render the necessary assistance with the minimum amount of effort and time being expended.

It would seem possible to develop in some local departments an effective industrial hygiene control program designed to correct specific environmental conditions within the plant which might be responsible for occupational diseases. The complete state industrial hygiene service, which might be considered the more technical unit able to carry on complete industrial studies, would be available to the municipalities for consultation and for the more involved technical studies.

The engineer who has been used in the above discussion might not be able to devote his entire time to industrial hygiene. It would appear that, in a well organized public health engineering program, room can be found for a basic amount of industrial hygiene activities of the types outlined. Such services, if on a part-time basis, would be assigned to an engineer having other duties somewhat related to industrial hygiene. For example, school sanitation, housing, factory waste disposal, etc., might be the duties of this worker. Some or all of these services would include activities which would be closely

related to similar ones to be found in plants. General ventilation, lighting, and sanitation are examples. Such joint activities should be planned by the local health administrators to insure proper coördination, and so that a balanced program would be carried on in all these fields of activity. It would be advisable to develop these services with the idea of gradually transferring the school sanitation and other activities to other workers in the department as soon as additional personnel could be procured, thus progressively increasing the engineer's duties in the field of industrial hygiene.

Some local health departments might not have an engineer-assistant available for engaging in industrial hygiene, but it might be possible to utilize the services of some other worker in the engineering division. For example, a college graduate with several years' experience in general community sanitation might be the only man available. Even though he might not have had any formal engineering training, it would seem that such a worker could render some effective service in this capacity. The scope and type of his work would not be on the same plane perhaps as that of an engineer, but, with the same type of supervision and assistance as outlined above, it would seem that he could make a worth while contribution in this field of service.

The foregoing illustrations of how industrial hygiene service might be added to the program of local health departments have been confined to the sanitary engineering division. It is not implied, however, that other local workers might not be given responsibilities in such a coördinated activity. The medical and nursing workers should be able to carry on some worth while activities along their respective lines of endeavor. The ways whereby these people may be of service will not be outlined in detail here. It appears sufficient to state that the medical officer and any assistants he might have would have opportunities to participate in studies made by state industrial hygiene workers. They should also be able to make cursory investigations for the purposes of noting progress in control efforts and to make preliminary evaluations of potential health hazards in individual plants. The service which they could render to local physicians concerning the diagnosis and control of occupational diseases should receive the same type of consideration as consultation service concerning communicable diseases. Neither type of disease can be ignored in a properly organized preventive medicine program.

There is a growing demand for industrial nurses. Many of the plant nurses have had no training in public health but would be willing to coöperate in efforts to enrich the benefits of public health nursing service. It is just as important for the industrial nurse to practise preventive nursing as it is for the industrial physician to practise preventive medicine. Any public health nurse who overlooks the opportunity of working with plant nurses along these lines is missing an excellent opportunity to further the cause of public health. In addition to the general accomplishments in the field of general public health, there should be many opportunities for rendering definite nursing service in the plants. Many of the industries do not have nurses. These plants should afford excellent opportunities for the public health nurse to be of service along the line of general prevention and also in specific efforts to safeguard the workers against harmful exposures in the plant.

Other examples may be given of the ways in which local health people can coöperate with state workers in coördinating industrial hygiene service with other phases of the health program. It is felt that almost any well organized local health agency can carry out a cer-

tain amount of industrial hygiene work. They should not be expected to render the same type of service or to the same extent as the state industrial hygiene service unit. There is little excuse, however, for them to feel that they can make no contributions to such a service. They are confronted with the question of whether they will do nothing about this phase of public health or do all that is within their power. The authors feel that it is entirely possible and justifiable for such organizations to participate in this field of work along lines outlined in this discussion. Such service should be a definite contribution to both the state-wide and local programs of public health service.

Suggested Grouping of Slow Lactose Fermenting Coliform Organisms*

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DELAYED or weak fermentation of lactose by coliform organisms has been recognized since 1893,[1] yet the sanitary significance of such organisms in water and in milk and other foods is still extremely puzzling. In fact, it must be admitted that sanitary quality is not always easily determined even when typical coliform organisms are involved. In a recent survey of 25 water laboratories McCrady[2] found that 3 expressed doubt of the sanitary significance of coliforms producing less than 10 per cent gas in presumptive tests. Two of these laboratories did so on the ground that these organisms were usually found in waters where the sanitary survey indicated an excellent supply. One laboratory doubted their significance because they were considered to be attenuated or devitalized coliform organisms and therefore of little sanitary significance. On the other hand, some of the 15 laboratories attaching full significance to these organisms did so on the ground that they represented attenuated cultures that might be easily rejuvenated under natural conditions. McCrady suggested that "until sufficient evidence to the contrary is presented, water laboratories are well advised to include, in their routine coliform estimates, *all* coliform organisms confirmed from primary lactose broth."

As has been previously reported,[3] several water supplies in Connecticut when analyzed in strict accordance with *Standard Methods* failed to meet the U. S. Treasury Department standards for potable water. Nevertheless, sanitary surveys had indicated these waters were safe and in the last 25 years no epidemics of any sort had been traced to any of these supplies. From these waters an appreciable number of the coliforms found were isolated from primary lactose broth tubes showing less than 10 per cent gas in 48 hours. It is frequently postulated that environmental factors, such as chlorination, storage, and the presence or predominance of extraneous organisms, account for slow or weak fermentation of lactose by coliform organisms. When pure cultures react in this manner they are usually considered to be attenuated, degraded, or devitalized with respect to lactose, especially when the ability to ferment lactose rapidly is acquired after serial transplanting in lactose broth. In some cases it is true that the culture as a whole becomes a rapid fermenter through the restoration of a temporarily lost adaptive lactase. Frequently there

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is actually the elimination of a slow lactose fermenting variant by the overgrowth of a rapidly fermenting one in serial lactose transplants. The fact that slow fermentation of lactose by a coliform strain may be as inherent and fixed a property in that strain as is rapid fermentation by another strain, is overlooked by many bacteriologists. Consequently, to disregard slow or weak lactose fermenting organisms, particularly in the presumptive test, may be dangerous. Conversely, to condemn a water supply or a commodity simply because of their presence without further knowledge of the nature of the organisms in question may be unfair.

A proper approach to the problem of the sanitary significance of those members of the coliform group which ferment lactose slowly or weakly requires clear definition of terms. Even in the recent literature there has been a lack of consistent usage of the term "slow lactose fermenter" by individual workers. Some have used the term to apply to strains not producing gas in 24 hours at 37° C. while others have used it to describe strains not forming gas for 72 hours or even for many days. Still others have obviously been referring to weak fermenters rather than to slow. Recognizing the need for uniformity of usage, we are suggesting in this paper a logical terminology for the various types of these organisms which will hereafter be referred to collectively as "aberrant coliforms" rather than "slow lactose fermenters" since the latter term is insufficiently descriptive and has been used much too loosely heretofore.

We have used as a basis for the groupings suggested in this paper studies made in the last 3 years on more than 10,000 coliform cultures isolated from water, milk, soil, cereals and feces in the laboratories of Brown University and in the Bureau of Laboratories of the Connecticut State Department of Health. In our studies we have separated aberrant coliforms from typical coliforms using as a criterion for the latter types the formation of 20 per cent or more of gas in lactose broth in 48 hours at 37° C. In the course of this work several hundred of these aberrant coliform strains were isolated. Of these, more than 300 strains have been carefully studied in their biochemical reactions, especially reactions in lactose, and the antigenic relationships to typical lactose fermenting coliforms have been determined for about 100 of these strains. The results of these investigations seem to throw some light on the sanitary significance of certain kinds of aberrant coliforms. On the basis of these studies we suggest the following tentative classification of aberrant coliform organisms into four more or less definite major groups:

I. Micro-aerogenic coliforms
II. Pseudomicro-aerogenic coliforms
III. Papillae-forming coliforms
IV. Anaerogenic coliforms

A group tentatively called "non-lactose fermenting" coliform organisms will also be discussed but cannot at present be given definite recognition.

I. MICRO-AEROGENIC COLIFORMS

Organisms in this group are genuine slow lactose fermenting coliform organisms and they may belong to the *Aerobacter*, to the intermediate or to the *Escherichia* section of the coliform group. They produce acid in lactose broth with from a bubble to 10 per cent gas in 48 hours although some do produce 20–100 per cent gas in 3–9 days. In this group no low temperature effect is evident as in the case of some aberrant coliforms; in fact, these cultures produce acid and gas more slowly at room temperature than at 37° C.

The organisms of this group grow as well in 24 hours in lactose broth as do typical coliform cultures. At the end of 24–36 hours lactose broth becomes strongly alkaline. This is followed first

by acidification of the broth in the inner vial and then (1–4 days later) by a general acid reaction and the appearance of gas bubbles. So characteristic in the presence of indicator is the first appearance of acid within the inner vial while the surrounding medium is strongly alkaline that one would suspect an association between this lactose fermentation and anaerobic conditions. However, when a number of such cultures were incubated under partially anaerobic conditions no marked increase in the speed of fermentation occurred.

When plated on eosin-methylene blue agar, one or more days after having produced acid and gas in lactose broth, many cultures of this group develop only white colonies. When several colonies are transferred to lactose broth all transplants show acid and gas at approximately the same time as the parent culture. If the plate is incubated and examined daily it will be found that all the colonies develop black centers or sectors at about the same time. In our studies serial plating and transfer to lactose broth failed to increase the speed of fermentation of several cultures.

Some cultures of this group, when plated on E.M.B. agar in the manner just described, develop both black and white colonies. Black colonies transferred to lactose broth produce acid and gas more rapidly than white ones do but, after selection of black colonies throughout a series of platings, gas production is seldom so rapid as that of typical coliforms.

Frequently organisms of this group fail to develop a black center but a dark area, always in the form of a triangular sector, appears in the colony. When replated or fished to lactose, such areas produce cultures fermenting lactose faster than does the parent colony but not so rapidly as do typical coliform cultures.

The majority of organisms studied in this group belong to the *Aerobacter* section. Such organisms are abundant in soil. Of 107 cultures isolated from soil in a rigidly posted area, 103 were micro-aerogenic *Aerobacter* and the other 4 were typical strains of *Aerobacter*. Micro-aerogenic coliforms isolated from water and milk have been predominantly of the *Aerobacter* section, occasionally of the intermediate section, and even less frequently of the *Escherichia* section of the group.

Many micro-aerogenic strains isolated from soil and occasionally from water and milk possess unusual colonial characteristics on E.M.B. agar. These colonies are flat and colorless—sometimes with a veil-like edge that has a marked tendency to spread. After 2–3 days one or more colonies on a plate develop into the usual, large, raised, mucoid and confluent type so characteristic of *Aerobacter*. Transplants from the "new growth," however, like the parent, ferment lactose slowly. Cultures occasionally lose their ability to produce either acid or gas from lactose though still fermenting dextrose readily. Cultures with these unusual colonial characteristics were isolated in large numbers from soil and sometimes from water and milk, but never from feces.

In spite of the fact that organisms of our Group I are predominantly *Aerobacter* strains, the difficulties of evaluating the sanitary significance of the presence of organisms of this group without determining the Imvic [4] reactions of the individuals isolated are illustrated by the following facts: True micro-aerogenic *Aerobacter*, intermediate and *Escherichia* cultures have been isolated from normal and pathological human feces, admittedly in small numbers. It is noteworthy that they were almost invariably accompanied by coliforms which fermented lactose with normal gas production. Furthermore, we have encountered an appreciable number of micro-aerogenic strains of all three sections in public water supplies,

mostly from samples of untreated water. Consequently, the sanitary significance of the micro-aerogenic coliforms would seem to depend upon their association with typical coliforms in the same sample and upon the sanitary survey.

II. PSEUDOMICRO-AEROGENIC COLIFORMS

This group differs from the micro-aerogenic group in that the slow or weak fermentation of lactose at 37° C. as detected in the presumptive test gives a false indication of the lactose-splitting activity of its members which are capable of normal lactose fermentation at a lower temperature. A differential in favor of a low optimal temperature is therefore the distinguishing characteristic of the pseudomicro-aerogenic group.

We have studied 137 aberrant coliforms with optimal temperatures below 37° C. but with general biochemical and serological reactions otherwise comparable to those *Aerobacter* and intermediate strains which actively ferment lactose at 37° C. These 137 cultures, isolated from water, soil, and milk, produced acid in lactose broth in 24–28 hours at 37° C. Some of them produced from a bubble to 10 per cent gas in 48 hours; others produced no gas in lactose broth in 21 days. Generally these cultures when plated on E.M.B. agar and incubated at 37° C. developed colonies ranging in size from that typical for coliform organisms down to colonies barely visible to the eye. The large colonies were wholly characteristic of typical *Aerobacter* or of intermediate organisms; that is, raised, moist, and confluent with a dark center or flat, dry and discrete with a large black center and high metallic luster. The small colonies were similar to the large except that the smaller the colony the less intense the black center, very small colonies being white. It was discovered that when the plate was left at room temperature for 24–48 hours, all colonies became large and typical for either the *Aerobacter* or the intermediate type.

The fermentation of lactose and the Imvic reactions of these organisms at 20° C. varied markedly from those at 37° C. All cultures produced acid and 20–100 per cent gas in lactose at the lower temperature in 24–72 hours. Some cultures negative on Simmons' citrate agar after 5 days at 37° C. were positive after 24 hours at 20° C. Many cultures were positive to some degree in both the methyl red and Voges-Proskauer tests at 37° C. but were negative in the methyl red and strongly positive in the Voges-Proskauer test at 20° C.[5]

An explanation of the MR-VP results is afforded by parallel growth curve determinations on three of these cultures at both temperatures. After 18–24 hours at 37° C., when one would expect formation of acetyl methyl carbinol to be well under way, the cultures were found to be in the stationary period or in the period of decline. On the other hand, 20° C. cultures were in the logarithmic phase at this time and for several hours later, and thus were capable of producing abundant acetyl methyl carbinol. Furthermore, the maximum concentration point of the cultures at 20° C. was several times higher than at 37° C.

When 44 of the 137 cultures failed to produce gas at 37° C. an attempt was made to convert them into normal lactose fermenters by serial transplants in lactose broth every 48 hours. At least 20 per cent gas was produced by 1 culture after 4 transplants; by 3 cultures after 8; and by 1 after 12 transplants. The remaining cultures up to this point had produced no gas at 37° C. The 12th transplant of each culture remained at 37° C. without further transplanting for 9 days. When finally transplanted again to lactose, 32 of the 44 cultures failed to grow. This appeared to indicate that a temperature of 37° C. was an adverse environment.

Accordingly, 27 of these 32 cultures were transplanted from the original stock cultures to lactose broth and after 24 hours each culture was transplanted to two tubes of lactose broth, one of which had been stored at room temperature and one of which had been preheated at 37° C. All cultures were then incubated at 37° C. All cultures inoculated into the broth that had been stored at room temperature produced acid in 24–48 hours. Only 3 of the cultures in the preheated lactose produced acid in 48 hours; the remainder either failed to grow or to produce even acid in 2 weeks. Apparently the time required to raise lactose broth from approximately 20° C. to 37° C. in an air heated incubator was sufficient for these pseudomicro-aerogenic cultures to start growing, and once started they continued to grow even in an adverse environment.

Ten cultures producing no gas at 37° C. were plated from lactose broth to E.M.B. agar and the plates incubated at 37° C. After 24 hour incubation one of the largest colonies from each culture was fished to lactose broth. After 48 hours at 37° C. the lactose broth cultures were again plated on E.M.B. agar and one of the largest colonies transferred to lactose. By repeating this process, selection of active fermenters within the parent cultures was possible. After from 3 to 5 such platings large colonies from 3 cultures could be depended upon to produce acid and 20 per cent gas in lactose at 37° C. in 24 hours. Nevertheless, after 10 such platings (20 successive transplants to a medium containing lactose) small non-gas-producing colonies could be isolated from these 3 cultures. For several platings the percentage of large colonies definitely increased, but whether a pure rapid lactose fermenting strain could have been obtained from any of the 3 cultures is questionable. Although 2 of the cultures after 10 platings gave cultures producing acid and 20 per cent gas at 37° C. in 48 hours, the remaining cultures after 10 platings failed to develop colonies producing gas in any quantity in 48 hours at 37° C.

Here we are obviously dealing with a temperature effect. No attempt has been made to determine the optimum temperature for these pseudomicro-aerogenic coliform organisms but it seems reasonable to assume that it is considerably below 37° C.

All of our pseudomicro-aerogenic cultures were isolated from water, milk, and soil. No such cultures were found in 600 fecal specimens. Moreover, about 82 per cent of these cultures belonged to the *Aerobacter* section of the coliform group with the general Imvic * formula of — — +++ and the remainder belonged to the intermediate section with the general formula — + — ++. No member of the *Escherichia* section with the temperature requirements of this group was isolated from any source.

There can be little or no question of the phylogenetic relationship of *Aerobacter* strains in this group to typical *Aerobacter* since 19 per cent of 22 such cultures agglutinated in 9 heterologous *Aerobacter* antisera to an average titer of 534 as compared with agglutination of 17 per cent of 103 typical *Aerobacter* cultures in the same antisera to an average titer of 1,148.[6]

A pseudomicro-aerogenic coliform organism may then be defined as one with an optimal temperature below 37° C. whose general biochemical and serological reactions are otherwise comparable to typical cultures of the *Aerobacter* and intermediate sections. In view of their temperature requirements, because they were not isolated from feces but from water, soil, and milk, and since no

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* The fifth reaction given is production of gas in cellobiose, not included in the original "Imvic" series.

comparable strain in the *Escherichia* section was encountered in a study of more than 10,000 coliform cultures from all sources, it is difficult to see how any sanitary significance can be attached to such organisms. Our experience suggests the advisability in routine water analysis of preheating the lactose broth and of rapidly warming the sample to 37° C. for the presumptive test where relatively large amounts of the sample are to be used. In many cases this would avoid weak fermentation of the lactose by this group of aberrant coliforms which are incapable of splitting this sugar unless growth is initiated at a lower temperature.

III. PAPILLAE-FORMING COLIFORMS

The term "papillae-forming coliforms" is suggested for the general description of those members of the entire coliform group which show the characteristics of organisms originally described by Neisser[7] and termed *Bacterium coli mutabile* by Massini.[8] The term "*coli mutabile*" is considered inadequate because it implies restriction of its use to members of the *Escherichia* section and is controversial because it implies that the type of variation evidenced by such organisms is a true mutation.

Organisms in this group may produce acid and small amounts of gas in lactose broth in 48 hours. Later as much as 30–40 per cent gas may be produced. When growth from a lactose tube in which acid and gas have been produced is plated on E.M.B. agar, both black and white colonies develop. Black colonies possess every characteristic of typical coliforms and when transferred to lactose broth produce acid and 20 per cent or more gas in 18–24 hours. Moreover, cultures established from black colonies breed true and their origin as a variant of a slow lactose fermenting strain can be determined only by serological methods.[9] White colonies in 2–5 days show several small, black, daughter colonies within the white parent colony. A white colony transferred to lactose produces acid and gas slowly and, when replated, black and white colonies again develop.

Many workers[10–14] have agreed that the "mutating" tendency of these organisms is as fixed a character as is the ability of a normal coliform to ferment lactose rapidly. Massini's original culture remained constant in this "mutating" characteristic for 22 years. In the laboratory at Brown University a culture isolated from a severe gastroenteritis case remained constant for 15 years despite many attempts to alter this characteristic. However, serial transplants of papillae-forming coliforms in lactose broth, especially if the transplants are made some time after acid and gas have formed, often result in a pure rapid lactose fermenting strain. This is not a true change in the fundamental nature of the strain but rather an elimination of the slow lactose fermenting variant because the longer the lactose tube is incubated the greater is the relative proportion of rapid lactose fermenters in the culture. Consequently, successive inoculums carry increasingly larger numbers of rapid lactose fermenters until a pure culture of the latter type results.

Coliform organisms showing the characteristics of this group may belong to the *Aerobacter*, the intermediate or the *Escherichia* section. The great majority, however, appear to be *Escherichia*. Despite the fact that Seiffert[15] in 1912 pointed out the differences between slow lactose fermenting coliforms and *Bacterium coli mutabile*, so many investigators have failed to make any distinction that it is difficult to determine how many were dealing with this papillae-forming group. Consequently, it is impossible to gain much information from the literature regarding the distribution of these forms in nature.

When we consider this group, it is evident, as Dulaney and Smith [16] and others have pointed out, that organisms that produce a small amount of gas from lactose are more often found in pathological fecal specimens than in normal feces. It is interesting to note that Massini's original culture was isolated from a case of "mild gastroenteritis."

Over a period of 2 years we plated fecal samples from 100 normal individuals on E.M.B. agar. Three of these samples yielded aberrant coliforms; none produced papillae-forming coliforms. Shortly after the work on normal individuals was completed fecal samples from more than 100 gastroenteritis patients and food handlers involved in an outbreak were studied. Papillae-forming and anaerogenic coliforms were isolated from 52 per cent of the individuals. There is no evidence to show that aberrant coliform organisms were the cause of this or similar outbreaks but the association noted here and reported by other workers would seem to be too frequent to be mere coincidence.

Because agglutinins for aberrant coliform organisms have been found in the blood of patients with gastroenteritis, Dudgeon and Pulvertaft,[17] Fothergill,[18] Ziegler,[19] and others are inclined to consider such organisms etiologically significant. Dudgeon,[20] Saniford,[21] Dulaney and Smith,[16] and others feel that the etiological rôle of these organisms has not been proved. We are inclined to agree with Parr [22] and with Dulaney and Smith [16] that the presence of aberrant coliform organisms in the intestinal tract may represent an alteration in the normal fecal flora, possibly as a result of a physiological disbalance in the individual. It has been shown [23] that a typical coliform isolated from a normal individual was identical, biochemically and antigenically by the mirror test, with a papillae-forming culture isolated from a patient with gastroenteritis. The infectivity of typical coliform organisms, particularly in the genitourinary tract, is too well known to merit further comment. It is wholly possible, therefore, that the infectivity of aberrant coliforms is not different from that of normal coliforms and is in no way conditioned by an altered reaction to lactose.

Serologically, "*coli mutabile*" strains of the *Escherichia* section did not prove to be so closely related to typical *Escherichia* as was previously demonstrated [6] for pseudomicro-aerogenic *Aerobacter* to typical *Aerobacter*. Of 113 typical *Escherichia* strains, 38 per cent agglutinated in 10 heterologous *Escherichia* antisera to an average titer of 1:1,261 while only 5 per cent of 32 papillae-forming strains of *Escherichia* agglutinated to an average titer of 1:250 in the same antisera.[23]

The facts presented strongly suggest that this group is the most important of all the aberrant coliforms from a sanitary standpoint. Perhaps the presence of papillae-forming coliforms in a commodity should carry even more weight than the presence of typical coliforms. Yet, if present, they are frequently not detected by routine methods, for instance, by *Standard Methods of Water Analysis,* since many strains do not produce gas or even acid in 48 hours.

IV. ANAEROGENIC COLIFORMS

To this group belong coliform organisms which produce acid in lactose broth in 1–7 days without gas production. Some of these produce gas from other carbohydrates. Others are anaerogenic in all carbohydrates and would ordinarily be classified as *Shigella* or *Eberthella* on the basis of their carbohydrate reactions.

That some of the anaerogenic organisms which might ordinarily be termed *Shigella* or *Eberthella* are coliform strains is illustrated by the behavior of 6 cultures isolated in the outbreak pre-

viously referred to and tentatively classified as *Shigella*. Three of these cultures spontaneously acquired the ability to produce gas in lactose broth and other carbohydrates, and a gas producing variant was isolated from a fourth culture. The other cultures are still being carried as anaerogenic although an occasional transplant to lactose produces from a bubble to 20 per cent gas. When E.M.B. plates were made from a gas producing transplant and 50 colonies fished to lactose, although acid and gas sometimes occurred in one or two tubes, no stabilized gas producing strain could be secured.

The relationship between anaerogenic coliforms and other members of the coliform group is not entirely clear. However, we cannot entirely support the suggestion of Breed and Norton [24] that the term "coliform group" be restricted to gas producing strains used as a measure of pollution in water since there is substantial evidence that a close relationship does exist. As previously pointed out,[5] many typical coliform cultures isolated from soil, water, and milk may lose their ability to produce gas in lactose. One culture isolated from milk as a typical coliform gave rise to a variant producing no gas in any carbohydrate after being carried in stock for 2 years. The parent and variant strains were antigenically identical.[9] A similar situation appears to be true for micro-aerogenic coliforms. Furthermore, originally anaerogenic cultures isolated from the same sources sometimes acquired the ability to produce gas in lactose. Although we have no real supporting evidence, we are inclined to believe that micro-aerogenic and anaerogenic coliforms when isolated from soil, water, and cereal are for the most part more primitive forms or "infra" [25] coliforms, whereas when isolated from apparently normal or from pathological feces they may merely be altered normal coliforms, non-pathogenic themselves, but suggestive of a pathological condition. Although the present methods of water analysis are not designed to detect the presence of anaerogenic coliforms, the question of their sanitary significance should be left open for future investigation.

Non-lactose-fermenting coliforms—In addition to the four groups of aberrant coliforms described, there is some evidence to show that non-lactose fermenting coliform organisms exist. The taxonomic position of these strains is not clear since they are represented by cultures intermediate between the coliform group and various non-coliform genera such as *Shigella*, *Proteus*, *Salmonella*, and *Serratia*. Penfold,[26] Hershey and Bronfenbrenner,[27] and others have produced non-lactose fermenting strains from typical coliforms after growth on chloracetic acid or sodium succinate media. Two typical coliforms isolated from milk by us produced non-lactose fermenting variants after being carried on agar slants for more than 2 years. Mirror tests have shown the variant strains to be antigenically identical with the parent strains.[9] Micro-aerogenic coliforms isolated from soil not infrequently lose their ability to ferment lactose while still producing acid and gas in dextrose and still retaining all other biochemical characteristics of the parent culture.

Frequently we have isolated from normal and from pathological feces certain non-lactose fermenting organisms producing acid and gas in dextrose, in sucrose or salicin or both, and in mannitol. Several such strains were encountered in the outbreak of gastroenteritis previously mentioned. Because of the production of indol and of acid and gas in sucrose or salicin or both we have been reluctant to record them as *Salmonella*. Though they were motile, the fact that there was no indication of "swarming" and that they produced acid and gas in mannitol [28]

seemed to suggest a closer relationship to the coliform group than to *Proteus*. Since their Imvic reactions were ++——— these cultures might be classified as non-lactose fermenting coliform organisms. Our knowledge of these types is so limited that no suggestion of their relationship to the coliform group or of their sanitary significance can be advanced at present.

SUMMARY AND CONCLUSIONS

Because much confusion in terminology has occurred in the literature relating to "slow lactose fermenting" members of the coliform group, it is suggested that the term "aberrant coliforms" be used to describe all Gram-negative, non-sporulating rods which ferment lactose slowly or weakly at 37° C.

Based on a study of more than 10,000 coliforms isolated from water, soil, milk, feces, and other sources, a tentative separation of the aberrant types into four groups is proposed as follows:

Aberrant Coliforms—Strains differing from typical coliforms in respect to their fermentation of lactose (producing less than 20 per cent gas in 48 hours at 37° C.).

I. *Micro-aerogenic coliforms*—Aberrant coliforms producing gas from lactose slowly or in small amounts at either 37° C. or 20° C.

II. *Pseudomicro-aerogenic coliforms*—Aberrant coliforms having the characteristics of the true micro-aerogenic strains at 37° C. but showing normal lactose splitting activity at 20° C.

III. *Papillae-forming coliforms*—Aberrant coliforms showing the type of dissociation evidenced by *Bacterium coli mutabile*, but not confined to the genus *Escherichia*.

IV. *Anaerogenic coliforms*—Aberrant coliforms producing acid but no gas from lactose.

The existence of a group of non-lactose-fermenting coliforms is recognized but this group is not sufficiently well delineated for satisfactory discussion.

The exact sanitary significance of aberrant coliforms is not entirely clear. The true micro-aerogenic coliforms (Group I) probably have a significance similar to that of comparable *Aerobacter*, intermediate, and *Escherichia* strains showing typical lactose fermentation. It is hardly logical to concede any significance to the pseudo-micro-aerogenic group (Group II) which is made up entirely of low temperature loving members of the *Aerobacter* section together with a few intermediates isolated from soil, water, and milk and which we have not isolated from feces in this investigation. The papillae-forming group (Group III) will be detected only infrequently in routine coliform estimates in which gas production is used as the criterion for their presence and the anaerogenic group (Group IV) will not be detected at all. However, these two groups may be highly significant because of their frequent association with gastroenteritis and genitourinary infections. Certainly no aberrant coliform giving a positive completed test in accordance with a strict interpretation of *Standard Methods of Water Analysis* should be disregarded without a further study of its characteristics.

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"I'll Take Mine Pasteurized!"

"The value of proper supervision of the milk supply of a congested population area is being continuously demonstrated throughout the state by the freedom of most of these areas from serious epidemics. There still remain the negative demonstrations, however, where the same lesson is taught by 'horrible example.'

"The numerous examples of serious outbreaks in the past, seem ample proof of the medical authorities' contention that milk is an attractive range for homesteading by many types of malignant germs, and particularly those of the streptococcus family. For that reason, since milk is most universally used for human food, it becomes necessary to maintain strict regulation and supervision of its production and distribution. Such regulations quite often encounter bitter opposition from the champions of individual liberty. I have on my desk, for instance, a copy of an editorial which attacks a proposed regulation for Middletown which would ban the citizens of that municipality from bringing in raw milk, even for their own consumption. . . .

"Well, now let's take a look at all sides to this question. I'll match my enthusiasm for individual liberty against the Middletown editor's any time. And I'm just as opposed to unwarranted governmental interference with individual freedom as any man in this country. But I put the emphasis on 'unwarranted.' Past experience with epidemics of disease traced to infected raw milk give considerable warrant for limiting the distribution of raw milk. For you see it has always been the policy of government in America to curb the individual when the exercise of his individual 'rights' interfered with the rights of his fellow citizens. That's why you can't park in front of a fire hydrant. *There might be a fire!* You see, government protection of the rights of all at the expense of the individual's unlimited freedom enters the field of possible damage to others as well as actual. That's the way it is with raw milk. It may be all right. But the government's regulations concerning it are based on the fact that past experience warrants the assumption that it may be all wrong!

"I used to be a very sincere defender of individual liberty as it affects raw milk. But I had to face facts. The rest of my former colleagues will have to face them sooner or later, also. Heating milk to a temperature of 143 to 145 degrees and holding it there for a period of 30 minutes, isn't too difficult. In the face of milk-borne epidemics in the state from 1917 to 1938 which affected the health of 8,382 people and involved 1,203 cases of typhoid, 123 cases of diphtheria, 1,442 cases of scarlet fever, 4,452 cases of septic sore throat, 311 cases of dysentery, 11 cases of polio and 840 cases of gastroenteritis, I'll take mine pasteurized!"—Condensed from an editorial in the *Endicott* [N. Y.] *Times*, January 4, 1940, and reprinted in *Health News* [New York State Department of Health], April 1, 1940.

Jaundice in Detroit*

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DURING the past year the Detroit Department of Health has been actively engaged in the epidemiological investigation of jaundice cases reported to this department. The first indication that an unusual number of such cases was present in various sections of the city came during January, 1938, when a physician practising in the northwest section reported 5 cases. In rapid succession, additional cases were reported in the same general locality. It became evident that the distribution of cases was city-wide, although there was a definite tendency of these cases to aggregate, as has been noted in a previous publication.[1]

An attempt was made to have all jaundice cases reported to the Department of Health during this study. Hospitals, practising physicians, school teachers, and nurses were requested to report the cases which came to their attention. Cases residing outside of Detroit city limits were not included. By observing the current cases and retrospective investigation of recovered cases, from November, 1937, to November, 1938, we were able to collect 220 cases of jaundice. This probably does not represent all the cases that occurred in Detroit during this time, but we know of no others. With no change in our endeavors, during the first 6 months of 1939 there were 80 per cent fewer jaundice cases reported than for a similar period of 1938.

Information about the cases is based primarily on the history given by the patient or parent rather than actual observation, since most of the patients were confined to their homes during the illness rather than to a hospital. Some of the variations in findings may be explained on this basis.

After carefully studying the epidemiological and clinical histories of 220 cases, 194 cases were selected which appeared most likely to be of an infectious type. The criteria for the selection were based primarily on the presence or absence of typical symptoms indicative of an infection, namely, chills, chilly sensation, temperature rise, nausea, vomiting, and headache for 4 to 7 days, followed by jaundice. Communicability, as shown by history, was also an important criterion. The remainder of the cases reported did not fulfil these criteria, although some may have been of an infectious type.

TABLE 1

Jaundice in Detroit

Distribution of Cases by Month of Onset, 1937–1938

Month	*No. of Cases*
November	8
December	20
January	42
February	37
March	36
April	32
May	14
June	5
Total	194

* Read before the Epidemiology Section of the American Public Health Association at the Sixty-eighth Annual Meeting in Pittsburgh, Pa., October 20, 1939.

The analysis of the selected cases presents certain important facts. The highest incidence of reported cases was during winter and early spring. We note from Table 1 that of the 194 cases studied, 135, or 69.6 per cent, were reported during December, January, February, and March. There was a marked decline during the spring, and no cases were reported during the summer.

TABLE 2

Jaundice in Detroit

Distribution of Cases by Age and Sex, 1937–1938

Age	*No. of Cases*	*Sex* *M.*	*F.*
1– 4	5	4*	1
5– 9	77	39	38
10–14	85	36	49*
15 and over	27	16*	11
Total	194	95	99

* One case Weil's disease

From Table 2 we note that the difference in distribution, according to sex, is not significant. In the 5 to 9 age group there are 77 cases, and in the 10 to 14, 85 cases; 162, or 83.5 per cent, fall in ages between 5 and 14.

TABLE 3

Jaundice in Detroit

Number of Days between Alleged Onset and the Appearance of Jaundice, 1937–1938

Days	*No. of Cases*
1	12
2	10
3	14
4	26
5	23
6	22
7	40
8	10
9	4
10	5
11–14	15
15 and over	13
Total	194

Mean number of days — 6.7
Median number of days — 5.0

In Table 3 the cases are listed according to the number of days between onset and the appearance of jaundice. Twenty-six persons gave a history of 4 days; 23, 5 days; 22, 6 days; and 40, 7 days. One hundred and eleven persons, or 57.2 per cent, stated that they experienced a 4 to 7 day illness prior to the onset of jaundice. The mean between the onset and appearance of jaundice for the entire group was 6.7 days—the median 5 days. A number of persons experienced no prodromal symptoms. This may be because the early symptoms in many cases were very mild. It was quite apparent that in some instances the patient confused the prodromes with those of an acute coryza, or mild gastrointestinal disturbance.

TABLE 4

Jaundice in Detroit

Distribution of Cases According to the Duration of Manifest Jaundice by Days, 1937–1938

Days	*Cases*
1	0
2	0
3	0
4	3
5	10
6	32
7	51
8–14	70
15–21	14
22 and over	14
Total	194

Mean number of days — 10.5
Median number of days — 7.0

The distribution of cases according to the duration of jaundice is given in Table 4. Thirty-two patients gave a history of jaundice for 6 days; 51 for 7 days and 70 for 8 to 14 days. One hundred and fifty-three persons, or 78.8 per cent, showed jaundice that lasted 6 to 14 days. The mean duration of jaundice was 10.5 days, the median 7 days.

Table 5 shows the distribution of cases by duration. These figures take into consideration the actual period of

TABLE 5

Jaundice in Detroit

Duration of the Disease by Days, 1937–1938

Days	Cases
1–7	23
8–14	90
15–21	49
22–28	17
29 and over	15
Total	194

Mean number of days — 14.9
Median number of days — 13.0

illness, that is, from the onset of prodromes to the disappearance or near disappearance of manifest jaundice. Ninety persons had an 8 to 14 day illness, and 49 a 15 to 21 day illness. The mean duration was 14.9 days, the median 13 days.

One hundred and thirty-nine, or 71.6 per cent, indicated that the total duration of their disease was 8 to 21 days. A number of persons dated the onset of the disease at the appearance of jaundice, thus shortening the actual period of illness. In some instances during the later stages of the disease, although the persons were still jaundiced to some extent, they did not feel acutely ill and returned to work or school. Thus, by history, the subjective symptoms of the disease are often absent before actual clinical recovery. Conversely, no cases were encountered which gave a history of continued illness after the disappearance of jaundice.

TABLE 6

Jaundice in Detroit

The Absolute and Relative Occurrence of Signs and Symptoms by History or Observation, 1937–1938

Signs and Symptoms	No. of Cases	Per cent of Total Cases
Loss of appetite	181	93.3
Coffee-colored urine	177	91.2
Nausea	163	84.0
Vomiting	142	73.2
Clay-colored stools	130	67.0
Fever	119	61.4
Loss of weight	110	56.7
Headache	110	56.7
Drowsiness	101	52.0
Stomach ache	96	49.5
Backache	38	19.6
Pain in extremities	32	16.4
Chills	26	13.4
Epistaxis	25	12.9
Chilly sensation	23	11.9
Total cases	194	

The occurrence of signs and symptoms in the cases studied is given in Table 6, by order of their frequency. Loss of appetite, coffee-colored urine, nausea, vomiting, and clay-colored stools were among the most common. Fever, loss of weight, headache, and drowsiness were noted in over half the cases. The temperatures ranged between 99.6° F. and 103.6° F. The highest temperatures were noted during the prodromal period. A lower grade of fever was observed during the time when jaundice was present. The loss of weight, although not marked, in some cases reached a maximum of 10 to 15 per cent of the body weight. Gastro-intestinal disturbances, other than nausea and vomiting, were complained of by about half the patients. Backache, pain in the extremities, chills, chilly-sensation, and epistaxis, symptoms generally associated with Weil's disease, occurred in less than 20 per cent of the cases. However, the incidence of these manifestations is prevalent enough to be worthy of consideration in differential diagnosis.

TABLE 7

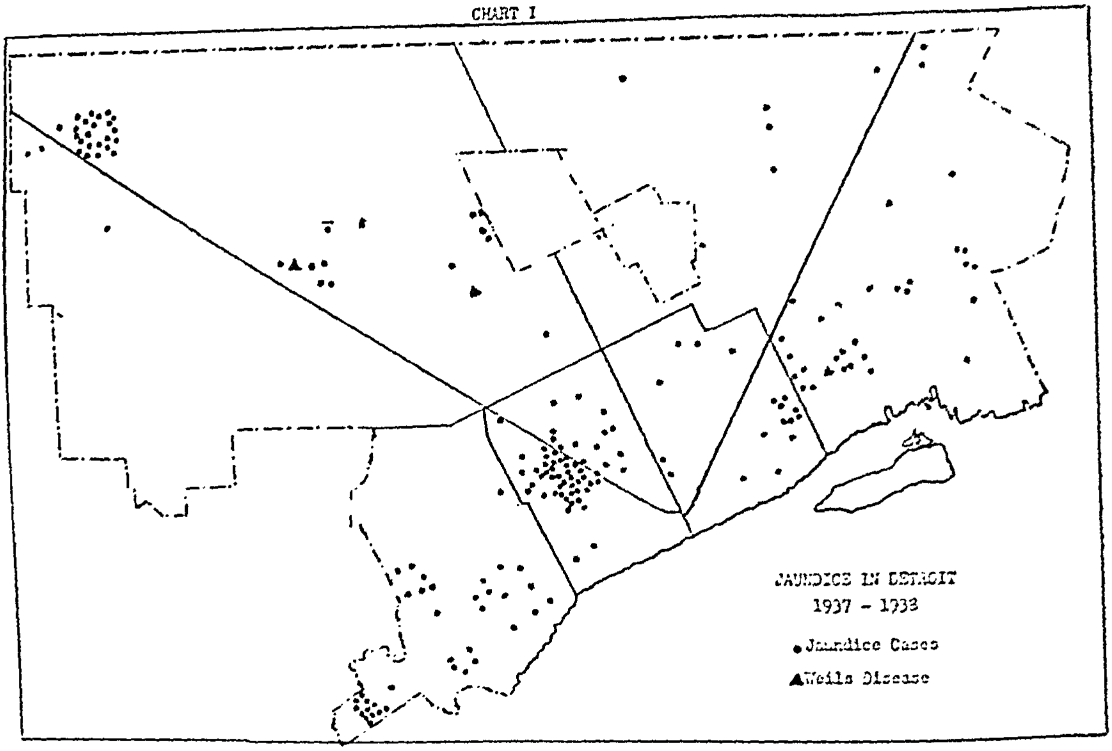
Jaundice in Detroit

Distribution of Cases by Families, 1937–1938

	Cases	Families
Number of families with one case		104
Number of families with multiple cases		40
Number of families with two cases	31	
Number of families with three cases	8	
Number of families with four cases	1	
Total number of families		144
Total number of cases	194	

We noted instances of multiple cases in families. Table 7 shows that the cases of jaundice were distributed among 144 families. Multiple cases were found

CHART I



in 40 families; 31 had 2 cases; 8 had 3; and one had 4. The number of persons affected in families was variable; in some instances only 1 child of 4 would become ill, while in others all the children would develop the condition with manifest jaundice. Contacts in some instances would develop the typical prodromes—some darkening of the urine and changes in the color of the stools, without jaundice. It is probable that on account of this variation in the behavior of the disease we missed some atypical secondary cases.

Geographically (Chart 1), the majority of the cases were reported from the west side of the city, although several were on the east side. It appeared at first that some relationship might exist between the incidence of jaundice and the Rouge River, which runs a winding, southerly course through the west side of Detroit. The first group of cases reported resided in proximity to the river and some patients admitted playing near it and skating. Careful investigation failed to substantiate a relationship.

Accidental immersion in water, cuts, bruises and abrasions of various parts of the body apparently did not have a significant bearing upon the development of most of these cases. Exposure to rats and rat-infested environments apparently did not influence the incidence of the disease in the majority of cases.

The presence of domestic animals in the infected households was a frequent occurrence. However, sick animals with indications, either by history or bacteriological or serological evidence of having suffered from an infectious type of jaundice, were found only in 5 instances. In 2 of the 5 we showed that owner and dog gave positive serologic reactions to the same strain of *Leptospira icterohaemorrhagiae*.

Of the 194 cases reported 171 were in children attending 57 schools. Two schools reported 21 each, and 8 over 6 cases each.

Probably the most significant epidemiological finding was the establishment of contact for 113, or 58.3 per cent, of the cases. The 113 persons

represent only those who gave a definite history of intimate contact with an active case. Cases with remote contact, as in schools, were not included.

TABLE 8

Jaundice in Detroit

Distribution of 113 Cases with Known Exposure by Probable Length of Incubation Period, 1937–1938

Days	*Cases*
1– 7	12
8–14	26
15–21	40
22–28	16
29 and over	19
Total	113

The largest number of cases (Table 8) had a probable incubation period of 2 to 3 weeks. Forty appear to have an incubation period of about 2½ weeks; 16 of about 3½ weeks, and 19 in excess of 4 weeks; thus, 35 cases appear to have probable incubation periods in excess of 3 weeks.

The negative epidemiological findings suggest that food, water, or contact with animals had no bearing upon the occurrence of these cases. The distribution of cases over a long period coupled with the general city-wide occurrence seems to eliminate food and water as a probable source of infection. The establishment of known intimate contact for over half the cases, and the incidence of secondary cases in families, is strongly suggestive of a disease spread by person to person contact.

LABORATORY FINDINGS

Blood counts taken early in the disease showed a tendency toward leucopenia, ranging from 7,200 down to 3,500, with a relative lymphocytosis. In the cases of Weil's disease which we encountered there was a definite leucocytosis ranging from 12,000 to 29,000, with an increase in polymorphonuclear leucocytes.

The icterus index in the majority of cases exceeded 15. The blood specimens were usually collected at a stage of the disease when the jaundice was most intense.

Further laboratory findings were negative in the majority of cases. Blood, urine, and feces were collected from all cases coming to our attention during the first week of the disease. Serologic and bacteriologic examinations on 60 cases so studied were negative. Specimens of blood collected late in the disease for serological studies were negative in all but 4 cases, in 3 of which the agglutination tests were positive in diagnostic dilutions with antigens of *Leptospira icterohaemorrhagiae,* while the 4th was positive with *Bacillus paratyphosus B.* Klemperer [2] has suggested that *Bacillus paratyphosus B* may be of etiologic significance in some cases.

The cases of jaundice encountered apparently were not of a common type or etiology. One hundred and ninety cases out of the 194 were mild, simulating closely clinically and epidemiologically, those reported by Bates,[3] Pickles,[4, 5] Blumer,[6] Ramage,[7] Willett,[8] and Cullinan.[9]

COMMENTS

In view of the negative laboratory findings, the epidemiological characteristics, the clinical characteristics, and the blood picture, it has been suggested that epidemic or common infective jaundice, as the English workers call this disease, is probably of virus etiology. Recently, Findlay [10] has brought evidence that strongly suggests that a hepatotoxic agent having many of the characteristics of a filterable virus can be found in pooled human blood serum. He believes that this agent is probably a filterable virus and identical with the causative agent of common infective jaundice.

The one great difficulty encountered in trying to establish the virus etiology

of common infective jaundice is the lack of a suitable experimental animal. Attempts have been made to infect every known laboratory animal and, with one exception, all have failed. Findlay[10] reports having obtained febrile reactions in *Macacus rhesus* monkeys by feeding them with whole blood from cases of jaundice in the early stages. Whether this reaction is a specific reaction or not needs further study.

WEIL'S DISEASE

It is not within the scope of this paper to give a detailed discussion of Weil's disease or true infectious jaundice. A detailed analysis of the Detroit experience from an epidemiological and clinical standpoint will be presented in a forthcoming publication. There were 3 cases of Weil's disease, recognized in the series of 194 cases of jaundice. Five additional cases of Weil's disease were seen during the past 18 months, but are not included because they occurred out of the study period, or in the suburban area of Detroit.

Of the 3 cases of leptospirosis reported in this series one was an adult male whose occupation as a poultry dresser exposed him to the risk of the disease. Two other cases in poultry workers are recorded among the 8 Detroit cases. The second and third cases of Weil's disease were in a 3 year old male and a 14 year old female. The boy apparently acquired the disease from his dog, while the source of infection of the girl was not definitely established.

In the 5 cases not considered in the series, 2 were adult poultry dressers, 2 were of teen age and 1 an unemployed adult male. Accidental immersion in contaminated bodies of water was considered the possible source of infection for the last 3. The dog of the teen age male was found to be suffering from Weil's disease, though it had recovered clinically several weeks before the patient became ill.

It has been stated in general that rats, and in some instances dogs, acting as carriers are responsible for the cases of leptospirosis occurring among humans.[11] The Leptospira pass out in the rat's urine, come in contact with water, mud, and food, and then find their way into the human or animal body. Ample evidence of infection among rats has been found in our studies. About 25 per cent of rats trapped in Detroit were found to be carriers of *Leptospira icterohaemorrhagiae.*

Two kennel outbreaks of jaundice were encountered during the past 18 months involving 14 puppies. Blood specimens gave positive agglutination with *Leptospira icterohaemorrhagiae* but were negative for *Leptospira canicola.* Blood collected from 16 other jaundiced dogs gave similar serologic reactions. In 2 the sera gave positive agglutination with both *Leptospira canicola* and *Leptospira icterohaemorrhagiae.* These results suggest a preponderance of infection among dogs with the classical strains of Leptospira, in contrast to the California experience where apparently the predominating infection is with the canicola strain.

In contrast to epidemic or common infective jaundice, Weil's disease as a general rule follows a severe course. The onset usually is sudden with chills, fever, severe myalgic pains, headache, and temperature, followed by deep jaundice. Davidson[12] and others have noted a mild form of this disease simulating epidemic jaundice, and also a mild form of leptospirosis without jaundice. Epidemiological information can be invaluable in the differential diagnosis of the various types of jaundice. In cases of Weil's disease usually there is a history of exposure to a rat infested environment, immersion in wa-

ter, swimming, exposure to sick dogs, or an occupational risk, as poultry dressing, slaughterhouse work, mining, sewer work and fishing. Seasonally, the greater number of cases occur during summer and early fall, while epidemic jaundice tends to have its highest seasonal prevalence during late fall and winter.

Although the clinical and epidemiological pictures of these two diseases appear to be clear-cut difficulty may be encountered in the differentiation of a mild form of Weil's disease from a severe form of infective jaundice. To differentiate the various forms of jaundice a laboratory equipped to do Leptospira agglutination tests should be available. The number of reported cases may not warrant the additional laboratory facilities, but it is probable that with increased laboratory facilities the number of recognized cases would materially increase. Certainly this has been the experience of the Dutch [11] and English workers.

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Community Health Education*

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THE peak of public interest in health stands towering before us, challenging all of us, who are interested in health education. Let us examine the landscape. The tree of health is deeply rooted in the soil of the biological, sanitary, and social sciences. It is heavily laden with fruit for the enrichment of life. Many people regularly eat of this fruit knowing by experience of its qualities which make for completeness of body, mind, and of character. Some have seen only the blossoms, having gained but partially a perspective regarding personal and community health. A large number wander in a maze of other trees bearing only superstition, unsupported theories, and charlatanism. While clouds darken the horizon from time to time, blue sky is beginning to appear with a ray of sunshine.

Much of the confusion as to the meaning and methods of public health must be cleared away by careful instruction if we are to advance with maximum effectiveness. This confusion, by the way, is not surprising in view of the relatively new function of health education, of the rapid developments in the health field, and of the competition for interest in health between the authentic and the pressure groups. But progress in this field should be less difficult than in some other lines which bid for attention. For illustration, a scientist recently referred to the popularity of some of the concepts of Einstein even though the public has only a foggy notion of his theories. Or match with this the followers of Freud, thousands of whom, apparently have only a vague idea of his work. On the other hand, the elements of public health are not difficult to comprehend and many technics of health education have been developed. We need to use these technics and to rub shoulders with each other while selecting and using them.

Two closely related factors are involved in health education:

1. Application of health knowledge by the individual, involving improvement in health practices and attitudes to secure promotion of individual health. An essential feature is the health teaching of children in school as an integral part of the educational curriculum, but adult education is also an objective, with emphasis at all levels on learning by doing—participation.

2. Acceptance of responsibility by citizens who become aware through health education experiences of the needs and services, and recognize the opportunities and importance of giving their support to the development and maintenance of adequate health programs.

Both of these factors are dependent for success upon a third—the provision

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of professionally trained personnel, who have the vision, enthusiasm, and skill to work with people, lay and professional, as a team, in executing soundly conceived health programs.

Though many believe that the official health agency should lead in the planning and development of the health educational program, we are not of the opinion that health education can, or should, be the function of any agency alone; only by the coöperation of all related official and nonofficial agencies and professional groups can a community program be effective. The responsibility for program planning may be centralized in a single person or small group, but health education, to accomplish most, must be the concern and responsibility of the entire staff of all the health organizations in the community, each contributing to it wherever it can do best through its personal contacts and services. To insure that the elements be properly interwoven and a sound focus be obtained, there is required the use of sound educational technics under the leadership of trained and experienced workers.

Some of the objectives and trends may be considered under 10 headings—10 F's.

1. *Fullness of Living*—This is increasingly stressed as our main goal. The individuals who compose "the public" and are seeking for fullness of living must not only understand the various principles of hygiene as they affect their health, individually and collectively, but these same individuals must be motivated into putting the hygienic principles into practice.

People, by and large, live their lives behind almost impregnable ramparts of indifference to public affairs, engrossed in their own little problems, worries, and pleasures. When one surveys the ceaseless barrage of propaganda to which we are all subjected, he realizes the necessity for this protective wall. Nevertheless, the health educator's job is to penetrate these ramparts for, somehow, people must be made aware of their duties to themselves, their families, and their neighbors. We know that it can be done. There is room, even in the mind which seems to be completely occupied, for one more idea, if we can arrest attention, arouse curiosity, and appeal to a real want. Man's attention range is narrow, however. The educator must strike at the point where the defenses of apathy and self-interest are weakest.

If useful ideas are presented in such a manner as to create good will and favorable opinion, they may be acted upon. But motivation is necessary to provoke active response and influence conduct. The goals of public health education are so many and so diverse that only through teamwork of all community health agencies can there be hope of worth while achievement.

We must not assume that there is a well articulated, "science" of public health education. The pillars—psychological, sociological, and pedagogical—are, themselves, none too steady. Little use has been made of scientific methods in measuring the effect of educational projects and material. Though we must admit that this specialty in the public health field has, like Topsy, "just growed," it is not to say that there are no useful and trustworthy guideposts which the practitioner of health education may well follow. Also we recognize certain pitfalls into which pioneers have stumbled. These, too, we can mark—with warnings.

2. *Family and Community*—There are many conditions in the home which may affect the educational process. We need to view the community as a whole, to serve the family as a biological and sociological unit, to be more conscious of the church as an essential institution, and to minimize vested interests.

The "public" is not a vague mass

of people seeking health information. Far from it, the "public" is a very much alive group of men, women and youngsters, in families, who severally, go to make up the community. These individuals have characteristics of age, sex, race, occupation, religion, with varying economic and social levels, and all the resulting mixture of beliefs, traditions, and superstitions. Their interests and their vocabularies may have a bearing on their understanding of sound public health principles and practices. Their attitudes will run the gamut from stark indifference to violent opposition. As we consider our audience, let us bear these factors in mind.

3. *Fitness*—Among the gratifying trends we note promotion of employment of qualified personnel and of active board and committee member participation, with a stimulation of special university training of public health employees, definition of qualifications, better preparation of teachers, and encouragement of merit systems. Education to be effective must be done by people who have a background of educational experience. If health education is to be done, a knowledge of health principles and practices is also basic.

Public health education is not a water-tight compartment in the health program. It is an activity that permeates the fields of health and education. The sanitary engineer or the statistician usually has a well defined sphere of activity; not so the practising health educator. On the other hand, there should be much of the health educator in all the other specialists of the health agency staff. The health officer of today is no longer the sanitary policeman of an earlier generation. He should be, if he is to fulfil his obligations, a guide to his community in matters of health. The goal of the epidemiologist is not to enforce quarantine, but to teach people how to prevent the spread of infection. The sanitary inspector's chief purpose is not to catch violators of the sanitary code, but to instruct the proprietor how to secure the best sanitary conditions through good management of his property. The public health nurse is essentially a teacher of health in the home or conference. The clinics, and the physicians' and dentists' offices may likewise be useful centers for health education. Although each staff member of the health agency has obligations in the field of health education, there is still need for a health educator. In the small agency, the executive officer usually must assume, as part of his duties, those of the health educator. In larger agencies, a specialist in the field may be employed. Where the size of the staff warrants it, there should be a whole division of health education.

4. *Foresight*—Increasing attention is being given to planning with information of problems and resources, utilizing group thinking and committee projects. Health education is to be one of the projects in a health administrative program, to be administered by the executive officer, or by a specialist. What is to be done? Putting "first things first" is important. To determine what particular objectives are to be attained and how they shall be attacked requires a continuing analysis of the social and health conditions of the community, a decision upon the people who must be reached, and a selection of the services or ideas which will receive the greatest emphasis. The first task is to create a comprehensive picture of community life.

There are several reasons why it is useful to break down the community into homogeneous tracts to disclose such factors as race, habits, health hazards, occupations, and economic status. This is the best way (1) to make clear the emergent and orderly health education patterns; (2) to determine what groups are to be reached in order to improve

the situation most effectively; and (3) to adopt a program suited to the situation and the characteristics of the people to be influenced. Another obvious value of the community survey method is that the participants not only learn about the community, but acquire a sympathetic understanding of the problems of the different organizations, and receive a simulus for group planning and coöperative activity. It is supposed that the health officer will assume leadership in the conduct of studies of community problems and resources, but the other members of a study committee should represent all the social agencies and professions of the community engaged in health activities.*

5. *Facts* — Different kinds of facts are essential. Consider the national health plans and what they mean in terms of health education. The health goals toward which there are the greatest hopes of attainment are: promotion of maternal and child health; control of tuberculosis, syphilis, gonorrhea, pneumonia, and malaria; reduction of illness and incapacity from cancer and other chronic conditions; programs of industrial and mental hygiene, of nutrition, of housing. Which of these items should be stressed locally and when? What instruction should be given, and how should the schedule of activities be arranged in the preparation of a flexible calendar? Are there special local problems which should receive precedence over others? How small a part law enforcement will play in attaining these objectives! Practically, the programs will be largely educational, aimed at inducing people to follow hygienic precepts, to seek physical examination, and to obtain medical care when disease or defect is discovered. It is evident that the new national health program creates the need, as never before, for a psychologically sound, practical, productive health education program.

Facts as to what the people wish to know! As one observes the visitors at the two World's Fairs, for example, he is impressed with the great interest displayed in exhibits of an appendix operation, of the functions of glands, of the process of pregnancy, of sight conservation and work for the blind, as well as of pneumonia, syphilis, and tuberculosis.

What do we know or can we learn about pupil interest? In a California city, for example, 75 per cent of some 540 boys and girls in high school replying anonymously to questions regarding the biology course, stated as the most helpful—either "Study of the Human Body, or of Reproduction and Sex Hygiene." "Essentially, young people want to know how to be attractive, how to make themselves liked, how to get along with people, and they have one eye, more or less clear, on love and marriage."

In a coöperative study among 105 colleges, J. F. Rogers reports criticisms of college seniors: "By far the most numerous complaints of omission and suggestions for additions refer to matters concerning sex." One senior said "The discussion of sex should be elevated from the corner curbstone to the high school and college classrooms. It should be discussed frankly and not in subdued tones as an almost tabooed thing. Venereal diseases and misinformation are too prevalent for us to think that only the lower strata of

* There may likewise be need for a small but representative technical committee. On the national level, much has been accomplished by the Interdepartmental Committee to Coördinate Health and Welfare. In Connecticut, a growing sense of need for the formulation of policies to govern the development of the school health program led to the appointment of a committee to consider this entire field. This committee is representative of the more active professional and governmental groups concerned. Its functions are to advise the State Department of Education and to recommend appropriate policies, programs, and action. Its reports are discussed in the meetings of the various state agencies concerned and published in their journals.

society are lacking knowledge. Do something about it, please!" Shall we do something about meeting the interests of the pupil and of the family? Have we not too long overlooked the point of view and the conditions, ideas, curiosities back in the home, the consumer's viewpoint, in planning our health education programs?

Facts based on evaluation of problems and services! For example: School health education in the secondary schools of a southern state was evaluated[2] in terms of a state-wide study of dietary hygiene. Determinations of the food selection habits and dietary knowledge with their interrelationships among high school students were made in the light of possible causative factors.

In another study,[3] a health education program in the small rural elementary and the village secondary schools of a New York county was evaluated in terms of two objectives of the program, namely, the improvement of pupil health behavior and understanding in relation to health. Evidences of progress were sought through studies of pupil health practices, pupil health information, and phases of the program which may help to produce desirable changes.

The studies extended over a 6 year period during which time an experimental school health education project had been in progress. At the elementary level comparisons were made in this research between conditions as they existed in the one- and two-teacher schools near the beginning of the experimental project, and later in its growth. Comparisons also were made between conditions in this county and in a control group of schools in other counties.

Evaluation methods included pupil questionnaires on daily health practices; health information tests; classroom observations on pupil practices, teachers' work, and environmental conditions; teacher questionnaires on work in health education and health content of courses; school environmental surveys and parent interviews.

Other suggestions for evaluation have been given in the studies of the U. S. Public Health Service, and of the New York City Department of Health, in the *Appraisal Forms* of the American Public Health Association, and of the National Tuberculosis Association, and in the books of Turner,[4] and of Bauer and Hull.[5]

6. *Funds and Resources*—We need to know what funds and resources are available for public health and for health education, as well as what would be desirable for adequate programs. The American Public Health Association and the few city and state departments of health and of education with reasonably adequate programs have much information on this subject. It is generally recognized among public health workers that the proportion of the tax dollar devoted to health has been and still is exceedingly small in comparison with other activities. But is the public aware of this fact? Furthermore, health education should not be the first function to suffer when curtailments are made, even though it may have been the last item added to the budget. When budgets are threatened, health education is most needed. Observe the methods used for sales promotion! Some of these contain a lesson for us in health education.

There are many aids and resources for those engaged in health education. Some of these may be obtained for the asking, others may be purchased or rented at small cost. For example, some 60 national agencies are interested in school health education, as revealed by the National Conference for Coöperation in School Health Education.

7. *Flexibility of Program and Organization* — Older public health workers

among us, who suffered the so-called health teaching and stilted classroom calisthenics of an earlier generation, are pleasantly surprised at the modern school health program which emphasizes the physical, mental, and social aspects of the school child's health and of the teacher's health. They find that today's school program includes learning experiences that provide for healthful school life, through: (a) The provision of a healthful environment (sanitation, mental hygiene atmosphere); (b) The school health services with physicians, dentists, and nurses, for example, serving as school medical and dental advisers and health counsellors respectively, instead of school physicians, school dentists, and nurses engaged in somewhat perfunctory jobs; and (c) The supplementary formal instruction in personal and community health carefully planned and adapted. Most important of all, the best of present-day health teaching in the school is very definitely linked or interwoven with the other phases of community health.

It behooves the public health educator then to be ready to carry on from the point where the school teacher leaves off, as well as to coöperate with school health teachers by discussing methods of health instruction, by providing materials and factual data for common use, and by demonstrating to school children the community health problems and resources. Of great importance also is a recognition of the interrelationships of educational, health, and socio-economic factors. In turn, the school personnel are increasingly comparing notes with health workers and seeking assistance from them. School administrators and teachers need to recognize more fully the importance of health supervision and instruction while the health departments need to have a better understanding of the school programs and to work more closely with those responsible for these programs.

The selection of projects and the conduct of a program that will find ready public acceptance and will lead to effective action calls for clarity in planning and adaptation to the situation. We must individualize and dramatize specific problems—tuberculosis, syphilis, maternal and infant health, and the common rules of healthy living. Even the dangers of quackery and self-medication must be brought home as menaces to the health of the individual.

Programs should be varied. General information may be continuous, but intensive campaigns should concentrate upon those phases of the program for which some definite and immediate objective is the goal, the number of these special campaigns being limited and directed at the most emergent health hazards. It will become clear that if public health education is to be effective, it must be carried out according to a carefully devised plan based upon attainable objectives and available resources. A good plan provides for the use of all instruments and methods which may be used to advantage and conserves time, energy, and money.

Before getting down to the details of determining the public health problems and the educational measures that shall be adopted to meet them, it is well to give thought to the practical details of organizing for this campaign. If the community is large enough to have a number of social agencies, there is a need for united action, and this can best be secured through the creation of some sort of coördinating body, such as a health educational council—a central group of health and welfare organization staff members who are active in the health educational projects within their respective organizations. The real value of such a working committee becomes apparent as soon as a survey is made of the agencies concerned with public health in any important city, or large county or state.

When one considers the number and diversity of agencies, each going its own way to do what seems best for the group with which it is concerned, the possibilities are evident, on the one hand, for lost motion and cross purposes, and on the other, for a concerted, effective program of health promotion. It must be admitted that there often are obstacles in the way of a successful influential central organization of health educators. Usually, the stumbling blocks are personalities, for an opinionated, self-centered executive in one agency may make difficult a coördinated program. In addition, agencies interested in a single type of project often find it difficult to appreciate the necessity of correlating their work with that of the larger field. But the value of a central council of health educators is so obvious that a tactful, determined official usually can surmount the difficulties.

8. *Friendliness and Understanding*—A sympathetic understanding by the public of the health problems, of achievements, and of possibilities produces a significant effect in relation to services and unmet needs, and stimulates a desire to enlist support for essential services. Likewise, there must be friendliness toward and understanding of objectives if individual health instruction is to succeed. Mutual understanding among the various professional groups also fosters coöperation. The final test of health education is not how much information is broadcast, but the extent to which human behavior is influenced.

9. *Fun*—We should remember the importance of relaxation for ourselves and the value of working and playing together. Are we not inclined to take ourselves too seriously?

10. *Faith*—We certainly need faith in our goal, in our associates, and in our projects that are carefully planned and that foster team work. If the public is to respond to and support our program, the task must be so well done that the people will have faith in our work. We are all working for essentially the same objectives; we frequently discuss in separate groups (e.g., printed matter, motion pictures, exhibits, personal contact, school health education) the same puzzling questions; we sometimes wonder why one group works so independently; we worry over the complexity of our task. If we are to bridge the gap between available scientific knowledge and current practices by the promotion of sound health procedures, we must enlist the interest and secure the participation of all classes of people by concerted efforts. Many problems are to be met about which information must be secured and given, by selected methods, to various types of audiences. Advance joint community planning based on constructive analyses of problems and evaluation of services will yield results. In the words of a little farmer boy who helped his mother feed the sheep at night, "If we carry the lantern together, we can all see better."

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Healthier Health Meetings*

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THE bloody but unbowed survivor of more than 500 meetings, as a speaker, and an equal number as an innocent bystander, should be able to suggest an idea or two arising out of his tribulations. I shall talk about meetings of one kind only, namely, those which are arranged for the enlightenment of the public with relation to health. As for the hardships and vicissitudes of those who go to meetings like this—they asked for them!

There is an impression among health educators, or so it seems to the guest speaker sometimes, that a mysterious deity presides over meetings, and that into her lap one need only pour the ingredients, and the result depends wholly on her caprice. One gathers the impression that most public health education meetings arise out of the sudden impulse of somebody on a committee, to have a great public mass meeting, which often turns out to be neither public nor mass. Usually the idea is deftly committed to its parent for such bringing up and sustenance as it is fated to receive. Its prenatal care is often sketchy in the extreme, consisting largely of procuring permission to use an auditorium which may be available rent-free, the selection of a date without much regard for possible conflicts, an invitation to a speaker who will come for nothing, an announcement to the newspapers, and the pious hope that somebody will be present. The aftermath is a depressing fiasco and a resolution never to have another public lecture on health—never, never, never, until next time.

It has been my pleasure to attend, as a guest speaker, many delightfully planned meetings. The credit for most of these goes to women's organizations. Women have a social touch which men lack; they can create an atmosphere of gracious hospitality even about a health education meeting. It has also been part of my duty to attempt to speak under difficult circumstances, some of which could have been avoided. Any speaker worth his salt should be able, and willing, to take care of himself under adverse conditions when they are unavoidable, but it is needless and foolish to place handicaps upon audience and speaker when a little more effort and a better understanding of audiences would greatly enhance the chances for a successful meeting.

I recall a meeting for the public, arranged in the assembly hall of a high school. The seating capacity was 1,500, the audience 150, to be liberal about it. The stage was bare except for two folding chairs, and the curtain was up, revealing the unattractive walls backstage. The gentleman who arranged the meeting did not attend; he told me later that he drove past three times without being able to muster up the courage to

* Read before the Public Health Education Section of the American Public Health Association at the Sixty-eighth Annual Meeting in Pittsburgh, Pa., October 18, 1939.

enter. A self-appointed chairman finally introduced the speaker, getting his name wrong, his identity confused, and omitting his topic altogether. Nor was his introduction adequate to clarify the sponsorship and the purpose of the meeting.

Upon another occasion, I was asked to speak in commemoration of Hospital Day. The attendance was about 125; the capacity of the hall was 1,700. This meeting was better planned in so far as the mechanics were concerned—there were flowers, a table, a rostrum, ushers, and music; but it should never have been arranged for that date. A rival hospital was opening a new wing with a great public celebration, it was bank night in the local movies, there was a night baseball game, two important lodges held their regular meetings on that evening, and a local store was staying open for the express purpose of exhibiting Colleen Moore's famous dollhouse!

For contrast, consider this picture. In the pleasant community hall of a church, a young women's organization celebrated the annual husbands' guest night. Attractive surroundings, meeting called promptly, quick business session, welcome from the pastor, some genuinely good vocal selections, the speech, more excellent music, refreshments and social hour—success! Or, in a metropolitan blighted area, a humble cottage converted into a school where a weekly forum is held. The audience, underprivileged, shabby, poor, but alert, well informed, critical. No social amenities, but efficient businesslike handling of the meeting, sent the speaker away with the feeling of a good job well done. Or the well known smooth routine of the men's noon-day service clubs with luncheon, business, introductions, "razzberries," songs, and speech—all moving to the tick of the chairman's watch and the ever-present threat of gavel on gong.

When a meeting is arranged, or a speaker is invited to a meeting regularly scheduled, mutual obligations are created, and should be observed with scrupulous care. The speaker has no right to be late, and thus delay the meeting, but neither has the organization any right to waste his time by inviting him to appear far in advance of when he will be required, unless he clearly so understands. Business sessions following dinners are sometimes necessary, but at afternoon meetings, the time of the busy speaker should be conserved (unless he is in town for the meeting only) by inviting him for the time when he is really to be put upon the program. The speaker should expect to be present either before or after the speech to meet persons who desire to speak with him individually. He should not be expected to stand through a two hour tea, meeting individually more than 250 persons who leave their seats for a moment to meet him, and then be called upon to speak for an hour while these same guests recline in comfortable chairs. Either the speech was no good—and small wonder—or the tea was too good or the chairs too comfortable, for that audience sank into a happy state of lethargy and got nothing out of the occasion except the social contacts.

When a speaker is invited for a meeting, he should be permitted to understand clearly what the conditions are under which he comes. Are expenses to be offered him or honorarium, or both, or neither? This topic is handled as gingerly as if it were something unmentionable, like syphilis in 1890. Simple frankness is the solution. Have you money to pay expenses or honorarium, or both? Then say so, and say how much; speakers who have no organization budget or other provision for expenses should not be asked unless at least expenses can be paid. Expenses plus a modest honorarium often fails

really to recompense the speaker for the time, trouble, and sometimes actual loss involved in accepting a speaking engagement. Have you no money for speakers? Say so frankly. You will be able to get excellent speakers through many organizations which maintain services for just such occasions. Their speakers serve you gladly, and will neither expect nor, in many instances, accept honoraria or expenses. But make it clear. And when you invite a speaker to dinner, send him his dinner ticket or give it to him unobtrusively before the meeting, or you may find, to your embarrassment, that he has been refused admittance by a conscientious hotel employee, or has quietly paid for his own dinner to avoid embarrassment.

Your guest speaker, if he is from out-of-town, appreciates hospitality, within reason. He enjoys neither the bleak unfriendliness of a complete letting alone, nor such a round of entertainment that he has no time for rest, relaxation, marshalling of his thoughts, or even for shaving and getting his shoes shined and his clothes pressed. Making speeches is hard and responsible work for one who works at it, and you do not want one who does not. Do not ruin the most important speech, which usually comes in the evening, by too much hospitality during the day. And do not insist on cocktails. Wise speakers soon learn that more facile speeches may result from a cocktail or two, but not sounder or safer speeches.

Do not press speakers to accept your invitation to be a house guest. A dinner or an evening is fine, and there is a pleasant compliment implicit in the invitation to make your home his headquarters. But if he politely declines, consider that he is travelling, and perhaps has been for some time. He may need quick and convenient laundry, valet or barber service available at hotels; he may have to be accessible to the press; he may wish to do considerable telephoning or telegraphing without having to put the charges on a private line. Moreover, there are obligations of courtesy devolving upon a house-guest which may be inconvenient to a tired traveller scheduled for a number of speeches and a quick departure for more of the same at the next stop.

Speakers have obligations, too. First, they ought really to have something to say. Then they ought to be able to say it.

You have all heard the time-worn tale of the speaker, droning on without reference to the passing of time, whose attention was untactfully drawn to the calendar on the wall. He is no worse than the hem-haw-hem-hum, or the er-ah-er speaker, or the mumbler, or the microphone blaster, or the microphone dodger, or the fidgeter, or the hypercritical self-deprecator who should never have ascended a platform if he is half as bad as he says he is, or the "I-came-to-listen-not-to-speak" menace who then holds forth for 20 minutes, or the introducer who makes the speaker's speech for him, or the story-teller who forgets the point, or the egotist whose vocal cords vibrate only to the first person singular, or to many another whom you have experienced. No wonder audiences hail with glee the suggestion: "If all after-dinner speakers could be laid end to end — wouldn't that be wonderful?"

Seriously and practically, I suggest for those who have public health meetings to arrange, the following advice, beginning with that of the cynic to a couple about to be married—*Don't.* Don't arrange a public mass meeting for health education unless you must, but send your speakers where the audiences are. Send them to Rotary, Kiwanis, Civitan, Lions', Chamber of Commerce, A.B.C., Women's Clubs, P.T.A.'s, study groups, college or high school assemblies, forums, professional societies—in short, to ready-made audi-

ences seeking speakers, experienced in conducting meetings, eager for program material, and assuring the speaker of an audience whose size, importance, and characteristics can be judged in advance. But if you must arrange public meetings, then perhaps the following suggestions will be helpful:

1. Select a date as free as possible from conflicts; if necessary later, cancel, but do not postpone. Speakers should be invited early. They should never break an engagement, once agreed upon, except for illness or serious emergency.

2. Select a hall conveniently located and well known, and somewhat smaller than you think you will need. Make adequate arrangements for the meeting, including a chairman (and an alternate), ushers, programs, introductory music, or other program features, decorations, lighting, and ventilating.

3. Advertise the meeting, not once, but often. Use newspapers (including pictures), radio, posters, dodgers, letters to organizations, telephone calls, and word of mouth. Put the high school band, the P.T.A. Mother singers (or other comparable groups) on the program and their pictures in the paper, so they will talk about the meeting and bring their friends.

4. Neither overload the program, nor abandon it to utter desolation. Here is a suggested program:

7:30 P.M. Doors open, ushers on job. Committee chairman on job.

7:45 P.M. Presiding officer and alternate on job (prominent lay citizens if possible). High school band or orchestra starts playing while crowds gather (we hope).

8:00 P.M. Call to order; brief statement by chairman. Program as follows: Playlet, reading or musical numbers (short, and that means SHORT). Speech (45 minutes, plus 15 minutes for questions, or one hour speech). Musical numbers (short).

10:00 P.M. (or sooner) Chairman adjourns meeting with short remarks. Refreshments and social hour optional if group is small.

5. Have all who participate in the program understand that the chairman is as tough as they come, and will positively not permit anybody to steal anybody else's time—not even that of the audience after 10 o'clock.

Some Developments in the Water Pollution Research Program of the Public Health Service*

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THE headquarters station of the Public Health Service for research in matters pertaining to water, sewage, and stream pollution, now a section of the National Institute of Health, is located at Cincinnati, Ohio. This type of research has been a gradual development of the original pollution and natural purification study of the Ohio River organized and directed by the late Dr. Wade H. Frost. The same building then occupied is still in use but enlarged activities have rendered it inadequate. An allotment of $275,000 from the general public building fund has been made for a new laboratory building, construction of which will be started on a new site as soon as agreements for acquirement of the 8 acre property are consummated and plans can be completed.

The research work in which the station is engaged is concerned with sanitary problems pertaining to the uses of water, its pollution and purification. Recently the fundamental mechanism of the biochemical oxidation of organic matter, as it functions in biological methods of sewage treatment, has been under observation. Considerable experimental work has been completed concerning determination of the rates of oxygen withdrawal from flowing water by underlying sludge deposits. A field study of the sanitary condition of the Scioto River as affected by installation of modern methods of treatment of contributed sewage has been completed. A nation-wide continuing census of water and sewage treatment plants has been inaugurated. The station is also conducting an extensive laboratory study of the sanitary condition of the waters of the Ohio River and its tributaries as a part of the pollution survey being undertaken jointly by the Public Health Service and the U. S. Army Engineer Corps.

SEWAGE TREATMENT STUDIES

The primary objective of this research has been to determine the factors that impair the efficiency of the activated sludge method of sewage purification. Exploration of these interfering agencies has led to an investigation of the basic mechanism of the biological oxidation process of organic matter in liquids and the conditions which stimulate or retard its progress. It has been found advisable to work with individual parts of the complex biological and bio-

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chemical principles comprising the activated sludge process and to study the functioning of some of these separate parts free from interference and under controlled environment, and then gradually to assemble these parts and observe the resulting effect. Following this procedure and employing apparatus developed for observing the rate of oxygen use,[1] and using pure cultures obtained from individual cells isolated from activated sludge, have made it possible to develop certain conclusions concerning the oxidation process.

The predominant type of organisms in activated sludge appear to belong to the zoögleal group of bacteria. These bacteria, when aerated in pure culture in a clear synthetic medium or in sterilized sewage, produce a growth which exhibits the characteristic properties of activated sludge such as flocculation, rapid settling, and clear supernatant with high rates of oxidation and total purification of the contained soluble organic matter.[2] Following this lead, it has been possible to demonstrate the exceedingly high rate of oxidation of organic matter effected by activated sludge in comparison with the removal rate of biochemical oxygen demand (B.O.D.) regularly observed in streams or in the dilution process. It appears that the massed or clumped zoögleal bacteria maintained by proper aeration necessary for their rapid growth, explains the high rate of biochemical oxidation obtained in the activated sludge process.[3, 4] Pursuing this line of study further, the similarity of the clarification mechanism of normal activated sludge and of that occurring with the elementary pure bacterial culture sludge has been demonstrated. Moreover, it has been possible to trace the component rates of total purification, including the oxidation rate as distinguished from those of net adsorption and synthesis of organic matter occurring in the activated sludge process.[5] Further studies are now in progress which appear to demonstrate the close similarity in characteristics and functions of the zoögleal bacteria as obtained from activated sludge flocs and from the slime coatings of sewage sprinkling filters.

The problem of developing some practicable method for ascertaining quickly the condition of activated sludge by the plant operator has been given consideration. The B.O.D. reduction test appears to be an insensitive indicator of the change in purification capacity of activated sludge. The quantity of oxygen used per gram of suspended matter during a short aeration period of the sewage-sludge mixture was found to be a better index of activated sludge condition.[6]

Aside from devices for observing the rate of oxygen used, determination of the capacity of activated sludge for glucose removal from the substrate appears to offer some promise as a sludge index, as well as an explanation of the mechanism of removal of soluble organic constituents in sewage. Studies of the ash content of both pure culture zoögleal and normal activated sludge have indicated no definite relation between ash volume or composition and oxidation or total purification capacities.

The relationship of fungus growths of the Sphaerotilus type to sludge bulking is being studied. Our observations appear to indicate that Sphaerotilus requires very little oxygen for its growth, is therefore of small value as an oxidizing agent, and flourishes best when conditions detrimental to the normal growth and functioning of the zoögleal bacteria prevail in the sludge-sewage mixture. The previous work of Ruchhoft has been confirmed concerning the stimulation of Sphaerotilus growth afforded by carbohydrates in the sewage liquor. Results indicate that this growth stimulation is not directly proportional to the amount of mono- or di-saccha-

roses present, but is an indirect stimulus by a substance or substances present when excessive amounts of carbohydrate material upset the usual biological balance in normal activated sludge.

In research of this nature, development of suitable methods and exploration of incidental observations are generally necessary and profitable. Thus, it has been determined that the modified azide procedure [7] is of value in increasing the accuracy of the B.O.D. test in the presence of nitrites. It has also been discovered that the Winkler method for determination of the B.O.D. of river muds may be quite inaccurate owing to interference of contained substances such as insoluble sulphides with the reagents, but that many of these interfering compounds can be removed by coagulation previous to beginning the test for dissolved oxygen. Again, the dissolved oxygen saturation value of sewage was found to be approximately equal to that of clear water.[8]

STREAM OXIDATION STUDY

Experimental studies have been in progress over a considerable period designed to develop practical methods for evaluation of the capacities of flowing streams for natural oxidation of sewage and other organic wastes. Past studies have shown that the rate of natural oxidation of organic materials in solution and suspension in a natural body of water can be measured directly by the ordinary B.O.D. test of representative samples. The most uncertain element is the oxygen demand exerted by underlying sludge deposits which are not included in the water sample and are for this reason extremely difficult to measure, both as to their extent and their rates of oxidation under the conditions in which they exist naturally. Starting with the development of a rational method for calculating the deoxygenating effect of sludge deposits based upon observations of the B.O.D. of the supernatant water [9] and proceeding to the explanation of formulae by which rates of oxidation and reaeration and the trend of the resultant oxygen curve may be calculated from observations of progressive changes in the biochemical oxygen demand and dissolved oxygen content of a polluted stream [10] the results of experimental work have been presented showing the effect of various factors on the oxygen depletion and reaeration rates occurring.[11] Later direct experimental evidence on the oxidation rates of river bottom sediments now awaits critical analysis and publication. A complementary study has indicated that the rates of reaeration of sewage polluted streams, particularly when flowing at higher velocities, are materially lower than reaeration rates of unpolluted waters.[12]

SCIOTO RIVER STUDY

The evaluation of sewage treatment in definite terms of stream improvement has been the objective of a comprehensive field study of the sanitary condition of the Scioto River in Ohio during the past two years or more. The City of Columbus discharges its liquid wastes to the Scioto River. The original sewage treatment plant was entirely inadequate and obsolete and has been recently replaced by a modern one of the activated sludge type. Observations of the bacteriological, biological, and biochemical condition of the river waters and channel sediments were undertaken for a complete year throughout the 100 mile river stretch below Columbus, both prior to and following completion of the new sewage treatment works. The extensive analytical data are now being assembled and critically analyzed in preparation for publication of the results obtained and the conclusions possible to be drawn. A preliminary review of the data indicates that although the old Imhoff tank sprinkling filter plant was entirely inadequate, the effect of

this effluent on the river was not so detrimental as that discharged from the new plant when plain sedimentation only was employed during the first few months of its operation. However, when complete, activated sludge treatment was begun, a profound improvement in the sanitary condition of the stream promptly occurred. This improvement was definitely reflected in the bacteriological and plankton content and biochemical reactions of the water as well as in the animal life in the bottom sediments. Some incidental observations pertaining to stream biology and the verification of certain organisms as pollution indicators have been published.[13, 14, 15]

INVENTORY OF WATER AND SEWAGE TREATMENT PLANTS

Although the recently inaugurated continuing census of water and sewage treatment plants and stream pollution conditions throughout the United States is not a strictly fundamental research activity, it is intended to serve as a useful tool to locate problems in these fields and record progress made in their solution as well as to serve as an aid to the engineering divisions of state health departments. Work is in progress on the collection of basic data on each individual plant. As soon as sufficient data have been made available by the states, it is proposed to summarize them for publication and to revise such publications periodically. It is hoped that eventually the Public Health Service may act as a clearing house for the exchange of such information and thereby relieve the individual states of some requests for data of this nature.

OHIO RIVER POLLUTION SURVEY

Legislation enacted by the 75th Congress, first session, directed the Secretary of War to have made a comprehensive survey of the pollution of the Ohio River and its tributaries for determination of necessary corrective measures. Provision was also made for obtaining the coöperation and assistance of the Public Health Service in this activity. This survey is now in progress jointly by the U. S. Engineer Corps and the Public Health Service. To the Stream Pollution Investigations Station has been assigned the direction and conduct of all analytical work of the survey. Although this assignment is not primarily one of research, but rather one of fact finding, it does afford some possibilities of employing the assembled data for critical study. The central third of the watershed at present under observation extends from the mouth of the Kanawha at Point Pleasant, W. Va., to the mouth of the Kentucky at Carrollton, Ky., including the tributaries within this river stretch of about 280 miles, and comprises a watershed area of over 30,000 square miles. It is proposed to cover the upper section of the watershed in 1940 and the lower third in 1941.

The central laboratory for this field study is located at Cincinnati, to which point samples are brought by motor boats and automobiles from accessible main river sampling stations and tributaries. The upper section of this river stretch and tributary area is served similarly by a completely equipped floating laboratory. The fringes of the watershed not readily accessible to the two large laboratories are being covered by mobile laboratory units moving from place to place. Coincidental with the analytical work, the Public Health Service is collecting detailed data pertaining to the sources, nature, and extent of pollution contributed throughout the watershed.

A supplementary part of this Ohio River Study is an epidemiological and bacteriological investigation now in progress of the endemic and epidemic occurrence of intestinal disorders which may be water-borne. Such outbreaks of undetermined origin, are occurring with

increasing frequency, and while many of them have certain characteristics which cast suspicion on the drinking water supply, the causative factors are frequently obscure.

MISCELLANEOUS ACTIVITIES

In the conduct of any research program opportunities are always presented for exploring some interesting problems more or less directly related to the main objectives. In our bacteriological laboratories the enumeration of the coliform group of organisms in water samples comprises an appreciable portion of the routine work. The possibility of making direct counts of this group on some solid differential medium is being investigated. The results of such plate counts on duplicate samples from a large variety of sources are being correlated with those obtained by the standard methods of dilution procedure. The data thus far accumulated appear to indicate that the direct counts on brilliant green lactose bile agar are sufficiently accurate to justify serious consideration of this shortened procedure when the density of coliforms in the sample is sufficient to provide for accurate plate counts.

In the coverage of certain parts of the Ohio River watershed an opportunity was afforded to explore the plankton life existing in the acid mine waters draining from coal mines. It was found that such microscopic life was restricted to only a few specific forms.[16, 17]

The methods of preparation of plankton specimens for microscopic examination and the changes in appearance of some of them induced by formalin used for their preservation has also been the subject of a separate publication.[18] Another interesting study has been an endeavor to evaluate the contribution of dissolved oxygen supplied to water by a definite species of algae.[19]

The results of the research work of the station are generally published in the *Public Health Reports* and are usually available in the form of reprints. Certain of the technical papers pertaining to sewage research are printed simultaneously in *Sewage Works Journal* or separately in appropriate professional journals.

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Weekly and Seasonal Trends of Upper Respiratory Infections in a Group of 2,000 Students

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AN analysis of the incidence of common respiratory infections in a group of 2,000 students at the Phillips Exeter Academy indicated a characteristic weekly trend and a pseudo-seasonal trend. The data for the analysis are based on the daily health records of the Lamont Infirmary. During the period under examination, September, 1935, through June, 1939, over 6,800 colds were recorded.

We first observed that there was a rather consistent weekly cycle. We found that relatively few colds were reported over the week-end and on Wednesday, while Monday, Tuesday, Thursday, and Friday showed relatively high incidence rates. In order that the different terms * of the 4 year period might be compared on a common basis, we computed the ratio of the mean number of colds for each day of the week for the several terms to the mean incidence for the several terms. The results have been presented in Figure 1.

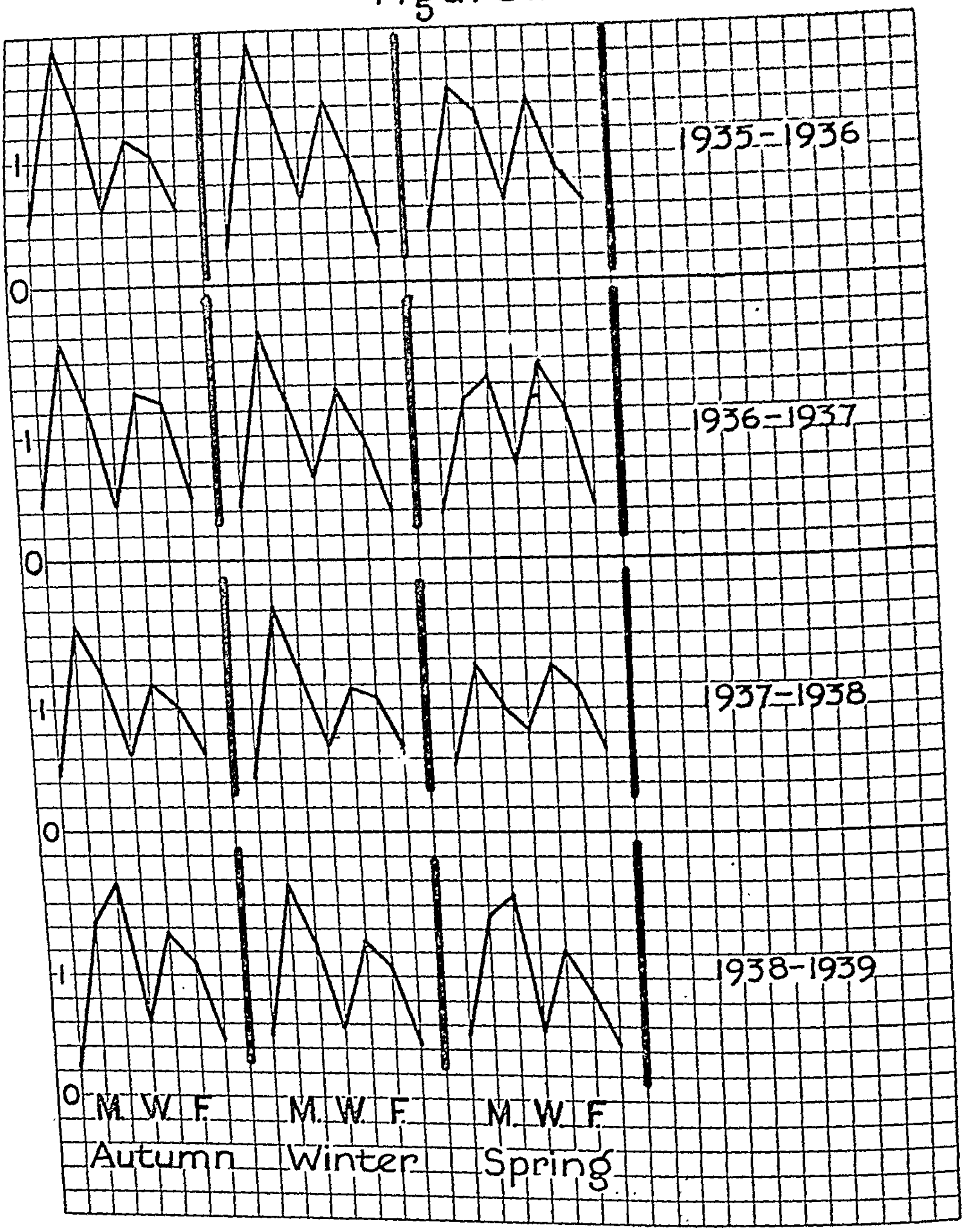
It will be noted that in general each fall and winter term has a curve differing from that of the spring term, especially during the first 3 years. In the 4th year the curves for the 3 terms are remarkably similar. Further it will be seen that week-ends and Wednesdays consistently have lower incidence values than the other days of the week.

Two hypotheses have been advanced to explain this very regular periodicity. The first hypothesis stated that this periodicity represented a psychological reaction of the student to the day of the week. The curves indicate that he was probably reluctant to report his "cold" on Wednesdays because of the half-day holiday, and over the week-end because on Saturdays there were athletic contests and movies, and Sunday was also free from class work. Obviously the student did not want to sacrifice these free hours to the possibility of confinement in the infirmary just because he had a cold. As a consequence, the other days of the week may indicate an accumulation of the colds that should have been reported sooner, plus the colds actually incurred over the week-end and on Wednesday. We have, therefore, appropriately named this weekly curve the "reluctance curve."

Yet it might be that this "reluctance curve" is autonomically influenced by a change in living habits over the week-end and on Wednesdays. Such an idea is the second hypothesis that was advanced to explain the weekly perio-

* The academic year is divided into fall, winter, and spring terms. The mean dates of these terms are respectively Sept. 21 to Dec. 17 (12 weeks); Jan. 5 to March 25 (11 weeks); and April 6 to June 15 (9 weeks).

Figure 1.



dicity. Especially over the week-end does the student change his living habits. He eats heavily and retires at most irregular hours on Saturday night. He generally sleeps late Sunday morning and then has a late breakfast and a heavy lunch within a very short period of time. This overeating and irregularity of sleeping hours might exert a definite effect on the normal biological equilibrium. Such a physiological disturbance might very well develop into a respiratory infection. A further factor is the movies. The large majority of the students sit for 3 hours in a stuffy, ill-ventilated gym, and then they go out into the cooler evening air, generally poorly clad; they become chilled, and if the chilling is severe, a cold may result. That this chilling might enter the picture in shown in Figure 1.

We see that in the fall and winter

terms the incidence is very high on Monday and Tuesday compared to the rest of the week, while in the spring the difference is not so great. In the fall and winter the temperature gradient between a warm, stuffy gym and the outside air is greater than in the spring. This gradient will cause a severer chilling, and it doubtlessly furthers the accumulation of Monday colds, especially during the fall and winter.

The spring of 1939 is of interest in this light. We noted previously that all the curves for this school year were similar. The spring of 1939 was unseasonably cold in New England, and possibly the weather factor played a part in raising the Monday and Tuesday cold level.

A further factor in evaluating the meaning of the weekly cycle is the influence of students taking week-ends (going out of Exeter to Boston or home). Since only 5 to 10 per cent of the student body, on the average, take week-ends, it was felt that they could not account in full for the low number of colds over the week-end. The change in habits and tiring trip were considered as possible factors in giving these students colds. If a large number of them returned to school with colds, the result might account for the Monday and Thursday peaks. Such a factor never contributed more than 20 per cent of the Monday colds, and the average proportion was under 5 per cent. Similar proportions were found to hold for the Wednesday-Thursday relation. It was thus clear that students going out of town contributed very little toward this weekly cycle.

The Medical Department of Phillips Andover (a school quite comparable to Exeter and in a nearby town) finds a similar periodicity and feels that it must be explained on a psychological basis. This fact seems to further the belief that reluctance is an important factor in the low incidence of new upper respiratory infections on Wednesdays, Saturdays, and Sundays. It is clear, on the other hand, that no definite conclusion can yet be reached concerning the meaning of the weekly cycle. Studies are, however, being made at the present time, and they may throw more light on it.

In Table 1 we have indicated the average monthly values of the daily incidence of new upper respiratory infections. It will be noted that the seasonal trend is not wholly consistent. That is, the maximum and the minimum periods of colds do not occur in the same months each year. For this reason we feel that the common cold has what de Rudder calls a pseudo-seasonal trend. Of course, it is by no means an extreme case, but it is, we feel, a case in point. The first 3 years have quite similar trends while the 4th year (1938–1939) has a much different one. There is a peak in December and in March. April is the

TABLE 1

Average Monthly Values of Daily Common Respiratory Infections

	1935–1936	1936–1937	1937–1938	1938–1939
September	8.8	5.2	6.6	6.8
October	5.4	6.2	5.9	4.0
November	6.0	4.1	5.5	4.1
December	6.6	6.2	11.6	*13.1*
January	*12.5*	*13.7*	*14.2*	9.9
February	10.3	11.3	11.7	9.4
March	9.0	8.2	9.7	*16.5*
April	6.8	7.5	3.0*	3.1*
May	3.8	4.5	3.9	5.8
June	2.7*	2.4*	3.8	4.2

The italicized values are the highest averages for the year, and the starred values are the lowest averages for the year.

lowest month, and it immediately follows the all time maximum.

If one examines the mean weekly incidence of the daily new colds, he finds greater variation from year to year. There occur numerous minor peaks in addition to the major seasonal periods of sickness. Both minor and major peaks are not wholly consistent from year to year, and we are consequently led to believe that a so-called normal incidence curve is not wholly reliable.

We found that the winter had approximately twice as many colds as the fall and spring terms. This fact might be related to the temperature levels at these different seasons.

In presenting these ideas, no attempt has been made to arrive at any final conclusion. We have only been interested in commenting on an observed weekly cycle and the seasonal trend in upper respiratory infections at a preparatory school.

NOTE: The author is deeply indebted to Miss Marjorie Evans and Dr. C. H. Sanford, of the Phillips Exeter Academy.

The Problem of the Gonococcus Carrier*

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CARRIERS of the gonococcus have been recognized for many years; yet even today little accurate information is available on the incidence and the duration of the carrier state. With the increased used of sulfanilamide and similar compounds for the treatment of gonococcal infection, a new importance attaches to the problem, as will immediately become apparent. Sulfanilamide therapy effects clinical recovery in many patients, but a considerable number continue to harbor the gonococcus after treatment and thereby become an unsuspected source of infection. The ability of the gonococcus to acquire tolerance for sulfanilamide is another aspect of the problem. Until recent years, studies on gonococcus carriers have not been practicable because of the unreliability of the laboratory methods available for diagnosis. An improved cultural method, now available, permits the detection of gonococci in exudates containing very few organisms and thus eliminates, to a large extent, the defects of the smear method of diagnosis.

Male and female carriers of the gonococcus have been described by a number of investigators, among them Chevallier and Schoengrunn,[1] Asch,[2] Franck,[3] and Janet.[4] David,[5] Belgodère,[6] and Wirz[7] believed that both sexes may carry the gonococcus for from 5 to 15 years. Fraser and Dye[8] reported that a case of gonococcal infection, latent for 50 years, was reactivated by prostatectomy, and Roussville and Trabaud[9] described the isolation of the gonococcus from a kidney 16 years after active infection.

The fact that many investigators have reported carriers of the gonococcus is evidence that they are not uncommon, but interesting as are their observations, all are subject to this one criticism, viz., that the information has been based upon clinical histories and upon patients' statements, which are notoriously of doubtful reliability when venereal disease is in question. The possibility of reinfection has not been eliminated in most cases. Moreover, the number of patients who carry the gonococcus and the length of time the organism may be retained in the body may have been underestimated because of the undependability of diagnoses based upon the examination of smears. Wolbarst,[10] it is true, conducted a survey in a state hospital where sexual contact was supposedly eliminated, but Franck,[11] who in a single year treated 37 male patients whom he said were infected by asymp-

* Prepared in coöperation with the United States Public Health Service and the authorities at Attica Prison. Read before the Laboratory Section of the American Public Health Association at the Sixty-eighth Annual Meeting in Pittsburgh, Pa., October 18, 1939.

tomatic females, did not exclude the possibility of other exposures. Various organs have been named as the reservoir of infection. Eastman [12] considers Cowper's glands and the verumontanum as the principal tissues in which the gonococcus persists. Young,[13] David,[5] and Belgodère [6] believe that the prostate, urethral glands, and epididymis harbor the organisms. That the gonococcus can frequently be recovered from the seminal fluid, when other exudates are negative, was emphasized by Lebreton,[14] Wirz,[7] and Roussville and Trabaud.[9]

The significance of sulfanilamide in the development of the carrier state is not yet fully understood, but there is little doubt that it plays an important rôle. Herrold and Palmer [15] studied a group of 23 symptomless patients who had been treated with sulfanilamide, and found that 12 remained positive for from 4 to 60 days after the drug was discontinued. A few other patients showed gonococci in smears for months after treatment. Pelouze [16] reported that five of his patients infected their wives after so-called sulfanilamide cure, and expressed the opinion, ". . . women infected by men improving under or made carriers by sulfanilamide medication usually become absolutely symptomless gonococcus carriers from the start. . . . During this carrier state in such patients, alcohol, sexual intercourse, and other things often fail to produce evidences of disease."

Another factor to be considered in sulfanilamide treated patients is the development of drug-fastness by the gonococcus. Many urologists believe that the gonococcus adapts itself readily to new drugs. Williamson,[17] in 1923, observed that the gonococcus developed resistance to certain drugs, and that cases of the disease responded less favorably to acriflavin after it had been in use for several years. Recent studies [18] have shown that, *in vitro*, the gonococcus readily acquires tolerance for high concentrations of sulfanilamide, sulfapyridine, and sulcamfamide when grown in gradually increasing concentrations of the compounds. This property of sulfanilamide will, no doubt, prove to be a point of great importance in view of the extensive use of the drug today.

To eliminate, as far as possible, the shortcomings of previous investigations, particularly the problem of reinfection, a study of male carriers has been undertaken in a penal institution where the inmates are under rigid supervision and the period of incarceration is long enough to make the findings significant. The State Prison at Attica, N. Y., was chosen because the facilities are superior to those of many institutions of this type, and the minimal sentence is 1 year, the average being 5 years. The incidence of gonococcal infection in male prisoners, and the length of time that men remain carriers after clinical recovery are aspects of the investigation that will be discussed presently. To detect the greatest possible number of positive cases, the cultural method has been used in conjunction with the examination of smears as a means of diagnosis.

SURVEY OF GONOCOCCUS CARRIERS IN MALE PRISON INMATES

The investigation is being conducted by members of the Department of Bacteriology of the University of Rochester School of Medicine and Dentistry, in coöperation with the U. S. Public Health Service, the New York State Department of Health, and the authorities of Attica Prison. The institution has a census of from 2,150 to 2,250 inmates, of whom approximately 15 per cent are Negroes. From 6 to 12 prisoners are admitted each week, and approximately that number dismissed or transferred. About 10 or 12 men are examined daily. The recently admitted

inmates are examined early in the week, and then those in residence at the time the study was begun are taken in the order of their admission. Subsequent examinations are made on men showing even minimal symptoms of genitourinary infection, and also on those without symptoms but from whom the gonococcus or some other species of the genus *Neisseria* is isolated.

Patients are examined individually. The past and present histories relative to genitourinary infection are recorded on a special form devised for the investigation, and a detailed examination is made of the genitourinary organs, rectum, and regional lymph nodes. Smears and cultures are prepared from urethral exudate, prostatic secretion, urinary sediment, and anal discharge, and are examined for gonococci in accordance with the methods recommended by the American Public Health Association.[19]

During the 9 months that the investigation has been in progress, 1,061 inmates have been examined. Of 937 whites, 330, or 35 per cent, admitted having had gonococcal infection, and of 124 Negroes, 62, or 50 per cent, gave a

TABLE 1

Data on 11 Gonococcus Carriers among Male Prison Inmates

Case No.	*Date of Gonococcal Infection*	*Therapy*	*Date of Admission to Prison*	*Period of Incarceration at Time of Examination*	*Clinical Signs and Symptoms of Gonococcal Infection*	*Laboratory Findings*				*Duration of Proved Carrier State*
						Smears		*Cultures*		
						*P**	*U†*	*P**	*U†*	
224	1934			3 wk.	Hesitancy at start of urination.	—		+	+	
	Dec. 1938		12/23/38	9 wk.	Moderately enlarged prostate.			+	+	9 wk.
363	1935	Chemical;	7/ 4/37	1 yr., 28 wk.	Slightly enlarged left epididymis.	—		—		
		vaccine		1 yr., 29 wk.	Moderately enlarged vas deferens.	—		—	-	1 yr., 29 wk.
				2 yr., 2 wk.	Nodular prostate.	—		—	—	
371				2 yr., 28 wk.	Moderately enlarged prostate. Slightly	—		+	+	
	1935	Urethral	8/ 7/36	2 yr., 39 wk.	enlarged left Cowper's gland.	?		+	+	3 yr., 1 wk.
		irrigations		2 yr., 46 wk.	Urethral exudate positive for gono-	—		+	+	
				3 yr., 1 wk.	cocci in smears and cultures.	—		+	+	
522	1937	Chemical;		7 wk.	Slightly enlarged prostate.	—		—	+	
		vaccine.	2/ 1/39	24 wk.	Occasional "morning drop."	—	—	+	—	28 wk.
	Aug. 1938	Self-treated		28 wk.		—		+		
524	Denied		12/ 2/38	16 wk.	Firm, moderately enlarged prostate.	—		—	+	30 wk.
				30 wk.	Slightly enlarged seminal vesicles.	—	—	—	—	
668	3 attacks:	Sulfanilamide	12/26/38	17 wk.	Enlarged prostate, left epididymis,	—		—	+	
	Latest:	vaccine		27 wk.	and left vas deferens. Occasional	—	—	—	—	17 wk.
	June, 1938			34 wk.	sharp pain in left testicle. Slight	—		—	—	
					urethral burning. Lumbar ache.					
					Occasional "morning drop."					
670		Urethral irri-			Urethral exudate. Stricture of an-					
	1920	gations, Oral	12/10/30	7 yr., 8 wk.	terior urethra. Purulent urethritis	+‡		+‡		7 yr., 3 wk.
		medication.			developed after sound was passed.					
884	1935			6 wk.	None	—		+	—	6 wk.
	May, 1939	Sulfanilamide	5/27/39	11 wk.		—		—	—	
891	1915	Local irriga-	4/26/39	11 wk.	Moderately enlarged prostate.	—	—	—	+	11 wk.
		tions.		16 wk.		—		—	—	
934	Denied		12/13/37	1 yr., 35 wk.	Slightly enlarged epididymis and vas	—		+	+	1 yr., 40 wk.
				1 yr., 40 wk.	deferens.	—		+	—	
1,007	1924		12/20/36	2 yr., 34 wk.	None	—	—		+	2 yr., 34 wk.

*P = prostatic secretion; †U = urinary sediment; ‡ = urethral exudate
All of the 11 carriers are white.

Staff Education Through a Study of Malnutrition in School Children*

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ALTHOUGH long recognized as a definite need in health departments, and carried on in a minor way in some instances, "in-service" training or staff education has received a new impetus in recent years due particularly to aid furnished by Social Security funds. With this assistance the New York City Department of Health has for 2 years maintained a special staff training project under a full-time faculty. These activities have been recently reported upon by Baumgartner.[1] The special application of in-service training to the school health service is the subject of this presentation. As a vehicle for one phase of our staff training of school physicians, a study of malnutrition among school children was chosen. This work has yielded definite benefits to the staff and new insight into the procedures for dealing with children characterized as undernourished in the school examinations.

NEED FOR STAFF TRAINING OF SCHOOL PHYSICIANS

Up to recent years the attitude among school physicians generally has been that their primary function was to examine a child and record the findings. Several years ago, three-fourths of the school physicians in the New York City Department of Health expressed this point of view. Only 4 out of 108 who were questioned even mentioned that the physician might serve as an adviser in the school; 24 mentioned education of the child, and 22 stated education of the family, as other functions that the physician might perform in his capacity as school physician.

One major weakness in the school examination as it was being conducted was the lack of emphasis placed on the child's medical history. When the parent appeared for the examination, the nurse generally conferred with her and took a routine type of history; however, this information appeared to have little practical relation to the physical inspection by the physician. One physician remarked that mothers "asked too many questions," and some complained that the presence of the parent "slowed up" the examinations. In some instances the nurses were requested by physicians to discourage mothers from coming to the examination because of their retarding effect on the number of children who could be seen in a morning. This is the absurd result of too much emphasis on quantity in examination. Disregard of the evidence which the child's medical history affords certainly decreases the accuracy of case selection. Statistics of defects among school children based on such inspection have little public health

* Read at a Joint Session of the American School Health Association, and the Food and Nutrition and Child Hygiene Sections of the American Public Health Association at the Sixty-eighth Annual Meeting in Pittsburgh, Pa., October 17, 1939.

significance. Moreover, this kind of school medical service is not in step with modern medical practice.

A new point of view is emerging as to the rôle of the school physician. Instead of being merely a medical inspector, his greater opportunity comes in being a medical adviser in the school. To give good advice the school physician needs to know more about the child and the family. Thus emphasis on history improves his ability as a diagnostician and as an adviser in health matters. This does not mean providing medical treatment. It means that the school physician must assume professional leadership with parent, nurse, and teacher in recognizing and planning the follow-through for health problems. Only in this way can he contribute to health education in the medical examination. Unless this is a part of the school examination, his service is sterile.

How to imbue our school medical staff with this new point of view was the problem. It could not be settled simply by an administrative order. To implant in the minds of the staff the reasonableness of a new and different approach and to instill a willingness and desire to proceed on this basis were fundamental problems which the staff education program had to undertake.

MALNUTRITION CHOSEN AS VEHICLE OF TRAINING

It was because the method of handling the child diagnosed as "malnourished" demonstrated most strikingly the defects of the medical examination, that the problem of the undernourished school child was selected. Pediatricians (Holt,[2] Smith,[3] Wile [4]) and nutritionists (Roberts [5]) agree on the complexity and interrelationship of the factors which produce the child called "malnourished."

In spite of this, school procedures still relied upon physical inspection to select children with malnutrition. No provision was made for the physician and nurse to gain insight into the child's habits and environment before follow-up was started. Lacking any better knowledge about the individual, the stock recommendation was "diet and rest." This was the answer of the school health service to the problem of malnutrition.

Here was a problem with potentialities. Its study appeared to offer the dynamic method of approach needed to change attitudes about the school service. If given the opportunity to visit the home to obtain a pediatric case history from the parent and to examine the child, a school physician could gain: (1) an appreciation of the complete child; (2) recognition of the value of symptomatology in the diagnosis of physical defects of school children; (3) a knowledge of home environment as it relates to the health of children; (4) recognition of the importance of rapport with the parent for a knowledge of the child and for planning follow-up care; (5) realization of the necessity of making recommendations pertinent to the needs of the individual child. On the basis of this experience an improved method for handling the problem of malnutrition in the school examination could be developed.

STUDY PROCEDURE

As a teaching device, this investigation had the following advantages: (1) flexibility, by permitting any number of physicians to participate; (2) stimulation of interest through the investigative and creative aspect of the work; (3) addition to knowledge about the problem of the malnourished school child; (4) sound education, since it is the application of the axiom—"to learn by doing." The problem set for the school physicians was an investigation of the malnourished children being carried in school medical files. The in-

formation was obtained by case histories taken from the parent in the child's home. One hundred and sixty physicians participated in this study during the summer of 1938. To develop a supervisory staff for this large number of field workers, 30 physicians were released from their routine assignments for intensive preparation during June. The pediatrician in charge of the program worked closely with these 30 physicians. This supervisory staff, by field work, tested and revised the questions to be asked by making home visits, and also assisted in working out details of procedure. This training for the supervisory staff was a valuable experience in itself, both to the director and the physicians, because of the close working association. Some of the physicians showed considerable initiative in the organization. By the end of this preparation a guide for conducting the interviews had been written, which was given to each field worker. The entire staff was brought together several times for general instructions and talks by qualified speakers on nutrition subjects. The 30 physicians-in-charge each had 4 or 5 physicians under his supervision. During the operation of the study, local meetings were held by these small groups in the field each week to discuss the case histories before sending them in to the central office.

OUTCOMES OF THE INQUIRY

This democratic process, with its use of problems, group discussion, and group planning, is undoubtedly slower in formulating and in putting new procedures into operation, but the benefits to the Health Department and to the individual staff member are more substantial.

The immediate results of this educational experience appear to be: (1) an appreciation by the school physician of the information to be derived through conference with the parent and a visit to the home of certain groups of school children; (2) an increased emphasis by the physician in regarding *all* children whom he meets in the service as individual problems; (3) a store of useful information regarding the general health, living conditions, dietary and health habits of more than 5,500 below-par children.

Of the 5,593 children visited, 2,343 were boys and 3,250 girls. Since the group was selected on the diagnosis of malnutrition, it was of interest to find that there were 900 more girls than boys in the study. The elementary school registration is approximately 411,000 boys, 397,000 girls, a preponderance of 14,000 boys in the city-wide school registration. The physicians visited the homes of 5,030 white and 550 colored children. The latter were for the most part in the Central Harlem and Bedford Health Districts. More than half of the children had one or both parents who were born outside of the United States. This is not strange since New York City has a larger foreign born population than the country as a whole. According to the 1930 census figures, 73 per cent of New York City's population is immigrant or first generation foreign born, whereas the figure for the country as a whole was 31 per cent. The largest single nationality represented was children with Italian born parents. The physicians visited 1,561 of these children, more than 25 per cent of the group. The Italian representation in New York City is 15 per cent of the population.

When the physicians considered the rental, occupation, and size of the family in judging the economic status, approximately three-fourths of the families were in the low income group. This judgment has more significance when one considers the reports on living conditions. About two-thirds of the children visited lived under crowded conditions. This figure is based upon the

number of rooms per person. Actually 3,319, or 62 per cent, of the children lived in families where there was one-half room or less per person. Two-thirds of the children were sleeping with one or more of the family. Sixty-two per cent lived in cold water flats, contrasted with the figure of 21 per cent which is given for all families of New York City.* All but two of the families were said to have toilets, but 25 per cent were sharing the toilet with another family, contrasted with 10 per cent of the families of New York City who share the toilet with another family.* The selection of this group was made on the basis of the school physician's diagnosis of malnutrition, and children from all sections of the city were included.

The physicians failed to mention temperament in one-third of the children. This suggests that the school physician gives inadequate consideration to the emotional makeup of the child and the importance of rest to the child's health. This type of information is useful for future staff education. When the temperament was mentioned, 90 per cent of the children were described as overactive, with only 7 per cent as normally active. The reliability of this information may be questioned. Mothers are prone to describe the normal motor activity of a child as excessive. One can imagine in many of these crowded homes, almost any activity to an overworked mother might be described in exaggerated terms. The thin, fussy, restless type of child is considered by many to be a malnutrition problem.

Forty-three per cent of the children had bad eating habits. This included dawdling or lingering over meals, forced feeding, frequent eating between meals with associated poor appetite, sweets between meals, and marked likes and dislikes of the usual foods. Close to 50 per cent of the children were described as having poor appetites.

A major finding was that in 4,180 or 75 per cent of 5,580 in which it was evaluated, the diet was inadequate.* In giving the cause for the inadequacy, poverty of the family or ignorance of dietary essentials by the parent were not the most frequent causes. Bad eating habits of the child appeared more frequently as a single factor or in combination with poverty and ignorance. Since two-thirds of the children were in families of low economic status and were living under crowded conditions, one might have expected a ready answer to be poverty.

It was the physician's belief that in more than half of the children, the type of body build of members of the family was related to the child's physique, and so was a factor in the physical appearance. In 6 per cent of the cases no other basis for the diagnosis of malnutrition was found. If this decision had been made at the routine school examination, valuable time and follow-up might have been saved. There is not much the school can do about inherited growth factors, except to recognize them when they exist. When the physician's appraisal of the child indicates that a slender body build is inherited, mere slenderness should not be a basis for selection of the child as having a physical defect.

Lack of understanding of child management was the next most frequent contributing cause of poor condition. An illustration of this educational problem is seen in the frequency of bad eating habits as a contributing cause of inadequate diet. This problem

* From Real Property Inventory of New York City, 1934. Information submitted by the Welfare Council Statistical Bureau.

* Evaluation of the diet was made on the basis of a "yardstick" for a minimum diet. This basis for judging the diets was prepared by Pauline Murrab, Nutritionist for the Health Department, who also assisted in preparing the physicians by giving several lectures.

should be handled through education of both parent and child. Stuart[7] has emphasized this aspect. He says: "We must try to develop in our child population attitudes toward food and habits of eating. . . . We must concentrate our educational efforts on the early ages."

Several conclusions from a study by British investigators[8] have a bearing on this work. Between 1919 and 1923 an investigation was made in Glasgow, Edinburgh, and Dundee, to determine the influence of various parental and environmental conditions upon nutrition. It was concluded that "heredity and the inherited growth impulse play no small part in determining the growth of the child." The only significant correlation in the careful statistical analysis of environmental factors was between the nutritional status of the child (expressed in terms of height and weight and general health) and "maternal efficiency" (judged by the tidiness of the home and the care children in the home received). Maternal efficiency was an important factor in the problem of growth and development, which a simple increase of income would not improve.

Education suggests itself as a more promising method of improving "maternal efficiency." Certainly when the mother lacks specific information on how to get medical care, the school service can help maternal efficiency. When the mother lacks understanding of simple facts about diet, rest, or child management, the school service can improve maternal care.

Recommendations based on the interview involved health education of the child and of the parent more frequently than any other single recommendation. Very few recommendations for social aid were made, in spite of the need for some assistance which frequently appears in the description of the child and his environment. Although it is possible that most of the families were already getting adequate help, the fact that no recommendations were made suggests a need in the education of school physicians. The physician should know enough about the operation of social agencies to know what steps to take in order to obtain social assistance for special needs of children and families. Thirty-two hundred and twenty-three children had social conditions as a factor in their situation, yet recommendations involving social and economic adjustments were made for only 716. These recommendations in most cases lacked insight into the fundamental social problem, but were confined to palliative measures such as more financial aid, more beds, or a school lunch for the child. There were few recommendations made by the physicians which indicated they recognized the need for actual social service case work.

A NEW PROCEDURE

A practical outcome of this experience is a new procedure for the handling of this malnutrition problem in the routine school work. This is now carried out in the New York City school health program and calls for a rapid screening by the school physician of any child referred through the teacher or nurse because of a below-par condition. Criteria used by teacher and nurse for such a condition are failure to gain, loss of weight, thinness, pallor, fatigue, or other signs which indicate a child is not functioning at his best. If the school physician confirms the judgment of the teacher and nurse, provision is made for a careful history and physical examination to be done by the physician *with the parent present*. Only after this type of examination is the physician expected to render judgment on the child's health status. At this time the physician and nurse plan a follow-up program with the parent for the individual child, and

this information is communicated to the teacher.*

This method of handling the problem was suggested independently by about 50 per cent of the physicians who responded to a questionnaire at the end of the summer study. A new term for such malnutrition suspects has been introduced, in the light of the summer nutrition study and subsequent discussion on this experience—"below-par." It is a broader term which directs attention to other influential factors in child growth and development. Six months elapsed from the beginning of the Summer Nutrition Study to the drafting of the new procedure for handling below-par children in the school medical service. An administrative order could have set up this new procedure overnight. An order, however, to 160 school physicians and 600 nurses will not change attitudes and give new meaning to routine school performances.

EFFECT OF THE STUDY ON THE ATTITUDE OF SCHOOL PHYSICIANS

This study is not presented as a contribution to the science of nutrition. It is the report of a successful method of staff education. Two by-products of this method have been described: (1) Useful information regarding the health and living conditions of malnourished children. (2) A new procedure for below-par children in the routine school work. This technic of using the study of an interesting problem in order to effect changes in attitudes, can be used profitably with a small staff or with a large organization. It is not new as an educational device, but it is timely to indicate it as a method which can be used by those engaged in public health staff education. The strongest evidence in support of the successful solution of the problem of staff education is the statements of the school physicians who participated in the malnutrition study. It is apparent that the staff found the work interesting because they were learning something new. One physician [8] published a most interesting and readable account of the diet and customs of a group of East Harlem families which had been visited.

* This information goes to the teacher on the pupil's individual Health Card which contains space for physician and nurse recommendations to teacher.

SUMMARY

Important results of the study lie in the valuable material obtained for future educational work with the staff, with parents and children, with teachers, and with community treatment resources.

This type of investigation has made it possible to put new emphasis on the school medical examination. It is an emphasis which stops not at the school medical inspection but calls upon the physician to use all his professional skill to recognize the need for medical attention, and to make the best use of his understanding of the problem to plan for care. These are principles of modern medical practice which are adaptable to public health service.

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THE PUBLIC KNOWLEDGE OF VENEREAL DISEASE

THE effort to get a law which adequately protects the public against adulterated food and drugs through Congress should still be fresh in our minds. Long before that we had the heroic fight made by Dr. Wiley. His experiences during that struggle for the benefit of mankind seem unbelievable. Between Dr. Wiley's time and the passage of the Federal Food, Drug and Cosmetics Act, many articles in both the scientific and the lay press have been written as well as a number of books, many of which have been reviewed in our columns.

In view of history, one would not expect to find such naïveté as is expressed in a recent article: "In the meantime intensive and increasing public education, it was thought, had reached a point where ignorance and credulity might be expected to be approaching a vanishing point."[1] The campaign against syphilis particularly has for several years past designedly attracted a great deal of attention to the venereal diseases. Some states have passed laws requiring examination before marriage. The lay press gives wide publicity to such requirements. Even the radio has modified its attitude. Everything has conspired to attract attention to the venereal diseases and it would be beyond human nature for the ghouls who fatten on the suffering of mankind to be blind to this awakened interest and the opportunity it affords for pushing their wares.

The exploitation of the sick is as old as time. The exploiters do not spare those suffering from the worst diseases or even the dying. In 1939 a survey was made[1] to evaluate the situation as regards illegal and unethical practices regarding the diagnosis and treatment of the venereal diseases, and to determine the extent to which public education has been effective in guiding the man on the street. Necessarily such a study took in drugstore prescribing without proper diagnosis. The results were discouraging and sickening.

The survey covered 35 cities in 26 states. Of 1,151 drugstores, 62 per cent were in the habit of diagnosing the disease and selling remedies alleged to cure syphilis and gonorrhea, while 31 per cent did not attempt diagnosis but stocked and sold bottled remedies. Only 7 per cent refused to diagnose or sell remedies. A good word must be said here for the national drugstore chains, most of which

sell the better known nostrums, but only on request, the statement being that managers have specific instructions from headquarters on the matter and are taught that ". . . the safest and surest way is to go to a doctor."

Among the countless preparations are some containing the newer drugs like neoprontosil and sulfanilamide, well known to be dangerous except under expert advice and administration. Certain states have passed stringent prohibitions against selling or dispensing sulfanilamide without a prescription. The Food and Drug Administration of the Federal Food, Drug and Cosmetics Act now in effect recognizes that when sulfanilamide and preparations containing it or related compounds are sold indiscriminately in a way which constitutes danger to health, when found in interstate commerce, are actionable.

The story of the prescribing and sale of nostrums is an old and sickening one. Have we improved or have we deteriorated? A similar survey was made in 1933 by the American Social Hygiene Association, and while over different territory, the results may be compared with those obtained in 1939. In 1933, 51 per cent of the managers of drugstores studied were counter-prescribing, 17.5 per cent did not diagnose, but did sell remedies on request, while 32 per cent refused to diagnose or sell remedies. In 1939, 62 per cent were counter-prescribing and 31 per cent sold remedies on request, while only 7 per cent refused to diagnose or sell remedies—a rather marked change for the worse.

In an attempt to find out what the man on the street knows and thinks on the treatment of syphilis and gonorrhea, 1,156 men in all walks of life were met casually, and in the course of general conversation, questioned as to where one could go for treatment. Of these, 65.4 per cent advised a drugstore remedy or self treatment, while 34 per cent said, "Go to a good doctor or clinic"; 3.2 per cent did not know, or gave no advice. In 1933, however, 2,175 men were similarly questioned, of whom 57.3 per cent gave advice to go to a drugstore for remedy or self treatment, and 3 per cent gave no opinion.

It appears from this comparison that in spite of the educational campaign against syphilis and venereal diseases that has been carried on, a considerably smaller percentage of the men on the street gave good advice in 1939 than did in 1933. Apparently the man on the street knows less in 1939 than he did in 1933 about where to go for diagnosis and treatment—certainly a discouraging finding. Popular education along these lines at least does not seem to have been efficacious, and there is still before us the enormous task of teaching people where to seek qualified medical care in general and for the venereal diseases in particular. In one respect improvement was noticed. Accurate figures do not exist, but there seems to be less advertising of quacks and nostrums, and the type of notice is not so flagrant as formerly. Everywhere reputable papers are refusing such material, though there is still too much in otherwise clean sheets, to say nothing of those which cater to the ignorant.

The amount of money spent for drugstore remedies and self treatment of the venereal diseases each year is not known. It certainly must run to tens of millions of dollars. The volume of advertising in newspapers and magazines, the number of quacks and charlatans who are in business, all indicate that there is an enormous amount paid for this vicious racket.

In what respect have our methods been faulty since they have failed to produce the desired results?

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ERNST ABBE
1840–1905

THIS year marks the 100th anniversary of the birth of Ernst Abbe to whom the world is indebted for the development of the modern microscope.

He was born on January 23, 1840. He early showed such ability that he was sent to the Universities of Göttingen and Jena, and when 23 years old was made lecturer on mathematics and physics in the latter university, to which he was attached throughout his life. In 1866 he became associated with Carl Zeiss as optical adviser, an event of outstanding importance in the development of optics, and which soon made Zeiss the leading manufacturer of microscopes in the world.

In 1878 Abbe worked out the computation of the homogeneous immersion lens at the instigation of J. Ware Stephenson, and Zeiss produced it. His condenser is universally used. The combination made the development of modern bacteriology possible.

His studies on optics and the theory of the microscope showed the necessity for optical glass of relatively different refractive index and dispersive power. He persuaded Otto Schott, who began experiments on optical glass in 1881, to move to Jena. More than 50 glasses were made and tried, with the result that in 1886 the most nearly perfect objective yet devised, the apochromatic, was produced by Zeiss, which, with the compensation ocular, also the work of Abbe, remains today the best combination known for visual microscopy.

The sciences of bacteriology and medicine owe more to Abbe than can be expressed in words. Abbe was absolutely unpretentious, a scientist in the highest sense and apparently devoid of personal ambition. Though reserved, he was approachable. He never had the general recognition which his scientific attainments and accomplishments warranted.

UNREASONABLE FEAR OF LEPROSY

ALTHOUGH nearly every textbook on medicine and nearly all special articles dealing with the communicability of leprosy carry a statement to the effect that prolonged and intimate contact is necessary for the transmission of the disease, there remains, among the medical profession generally a fear of the risk involved in even slight contact with a leper—an anxiety which is almost incomprehensible. This being true, perhaps it is not difficult to understand the even greater distrust among the general public. Furthermore, this dread is less in areas in which there is a real risk than where there is no risk, or only the most remote possibility of spread. The fact is not sufficiently well known by physicians, nor even by health officers, that in the United States the disease, with extremely rare exceptions, is communicable only in certain of the Gulf Coast states; elsewhere in the United States the probability of transmission is so remote as to be negligible from the public health point of view. There are examples of lepers suffering from some complicating conditions being refused admission to northern hospitals located in areas in which the danger of transmission of leprosy, even by prolonged and intimate contact, would be practically nonexistent.

In refreshing contrast to this attitude is the very sane view taken by health authorities in New York State. Not long since, a physician with extensive experi-

ence in the clinical and public health aspects of leprosy, by invitation of a local medical group in that state, gave a public clinic for physicians and medical students, using for clinical demonstration two lepers confined to a local hospital. The clinic was given local newspaper publicity without arousing any adverse comment. Contrasted with this is the action in a middle Atlantic state which used armed force to seize and to remove a leper from that state—a state in which no case of leprosy had ever originated and probably none ever will originate.

While the attitude of the general public is doubtless a heritage of Biblical times and therefore to some degree understandable, there is no excuse for health officers adopting this stand nor for participating in it; they know, or should know, that so far as the greater part of the country is concerned, there is no appreciable danger of the transmission of the disease, and even in areas in which it is endemic the danger is very small—aside from family contacts.

Even in the endemic foci there is no need for hurry in isolating a person suffering from the disease when perhaps for years he has been exposing his associates, possibly while the disease was in that stage of progress which made him a much greater menace then than he is at the time he is discovered to be a leper.

It is to be said that some physicians familiar with the disease consider it proper to advise patients to remove to an area in which health authorities are sensibly tolerant, or even to remain in self-imposed isolation at home.

TUBERCLE BACILLI OF THE BOVINE TYPE IN SKIN LESIONS

THE infection of man by tubercle bacilli of the bovine type and the distribution of the lesions produced by them continue to excite a deserved interest. The matter is one of continuous study in certain countries, England for example, and in others of more or less isolated investigations and happenings.

One of the latest comes from stricken Poland, and bad as the conditions there are described as being, we may confidently expect them to become worse, for a time at least. A limited investigation of the skin types of human tuberculosis has shown a very high prevalence of the bovine type in Western Poland,[1] and the author says that according to his observations the bovine type is more frequent in skin tuberculosis than in any other organ of the body. From 20 strains isolated from several types of skin lesions, 4 were distinctly of the bovine type, while 5 were of atypical character and are believed to have been, at least in part, bovine organisms modified by their environment. Lack of facilities prevented a complete study of these cultures as to virulence, which would probably have increased the percentage of cases due to the bovine type of organism.

That long residence in skin lesions may modify the virulence of the tubercle bacillus is borne out by other studies on lupus.[2] Of 25 cultures isolated from the skin lesions, 21 were human, 3 bovine, and 1 dysgonic human. Of these, 12 were much attenuated, 8 only moderately virulent, and 5 of full virulence, of which 3 were human and 2 bovine. The most attenuated strains were isolated from patients whose histories showed they had suffered longest from lupus and the authors suggest that the virulence was progressively lost during the long residence in the skin. On the other hand, attempts to lessen the virulence of the bovine bacillus by long culture have been unsuccessful, and types isolated from calcified intestinal lesions have in all instances that we know of been fully virulent.

Lupus vulgaris is the most frequent form of skin tuberculosis in Poland, over 80 per cent of the cases being of that type. Estimating the number of cases in Poland from the records of several large dermatological clinics, there are some 25,000 cases of lupus in that country, and further researches on the types of organism causing them are indicated for effective control of this disease.

The cattle in Poland have a rather high per cent of tuberculosis, though correct figures are not available. However, 30 per cent of virulent tubercle bacilli have been found in the market milk of Poznan, and in Warsaw 50 per cent of the market milk is contaminated with the tubercle bacillus. Considering these figures it is not surprising that any or all types of tuberculosis are found to be prevalent.

We in America are fortunate in respect to bovine tuberculosis, as in so many other ways. The campaign against this disease, which was a gigantic task, has been successful beyond what to many of us seemed possible. It was begun along very unwise lines which threatened failure, but we profited by the early experience and, under the guidance of competent men, and especially of our Bureau of Animal Industry, bovine tuberculosis is under good control. Due to this and to the increased use of pasteurized milk, the human manifestations of the disease are now rarely seen.

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BOOKS AND REPORTS

Ways to Community Health Education—*By Ira V. Hiscock, B.A., M.A., C.P.H. New York: The Commonwealth Fund,* 1939. 306 pp. Price, $3.00.

In writing this book Professor Hiscock had the collaboration of Mary P. Connolly, Marjorie Delavan, Raymond S. Patterson, and William H. F. Warthen. As the coöperative project of various experienced people, it takes particular recognizance of the importance of community organization for health education. General principles which should be the basis of any public health education program are treated comprehensively, from both the theoretical and practical points of view.

In the first section there is a consideration of objectives, fundamental principles, and administrative policies for health education, not only for the public as a whole, but also for specific groups within the community. The authors clarify their points by the liberal use of illustrative examples of actual situations.

A large section of the book deals with the various media with which the health educator should be familiar. The technics are discussed in such detail that the reader seeking specific information concerning any of these tools may use it as a practical handbook.

In the latter part of the volume there is a correlation of the technics and methods of application into a functional approach to the solution of the major problems now confronting workers in the field of public health. This section includes material on campaigns against diphtheria, tuberculosis, and syphilis; programs for promoting sanitation, and the various other important phases of personal and community health.

Throughout there is a wealth of illustration—both verbal and pictorial. It is written in a clear, forceful, and interesting style. The extensive references for further reading at the end of each chapter are particularly useful.

The book fully achieves its stated purpose, in providing "some necessary equipment to meet the rapidly growing need for special preparation in the art and science of public health education." It is another step forward in this relatively new professional field, and is a further indication of the place that health education has made for itself in the public health family.

C. E. Turner

Mineral Metabolism—*By Alfred T. Shohl, M.D. New York: Reinhold Publishing Corp.,* 1939. 384 pp. Price, $5.00.

This book was written for readers with a background of biochemistry and was not prepared primarily either for the specialist, or for the neophyte. It is a summary of "the rôle of the minerals in the structure and function of the human body." This is an ambitious undertaking, and covers a much more extensive field than one would be led to expect from a reading of the conventional type of journal review. The wide range of subject matter is illustrated by the following random selection of topics: Body water; electroneutrality; osmotic equilibrium; alimentary secretions; urine; ductless glands; muscle contraction; buffer

systems of the blood; Donnan equilibrium; acid- or alkaline-ash values; fasting. The physiological implications of the mineral elements are admirably correlated with the more customary quantitative data.

There are approximately 1,250 citations of the literature, and it is obvious that the author must have consulted many more. The vast majority of the papers cited were published in the last 20 years, and a considerable proportion of these appeared in the last 5.

The book should be especially useful to physicians, physiologists, biochemists, and to those interested in any aspect of the nutrition of man or animals. The type is clear, the format attractive, and there are very few typographical errors. It is the only publication of the kind, and it is exceedingly well done.

The chapter headings are: Introduction; Mineral Composition of the Body; Secretions and Excretions; Internal Secretions; Total Base, Chloride, Ammonium and Bicarbonate; Calcium and Magnesium; Phosphorus; Sulfur; Iron; Iodine; Traces; Water Metabolism; Anion-Cation Relationships; Mineral Intakes, Balances and Requirements; Author Index; Subject Index.

A. G. HOGAN

Industrial Health—Asset or Liability—*By C. O. Sappington, M.D., Dr.P.H. Chicago (160 N. LaSalle St.): Industrial Commentaries*, 1939. 224 pages and 24 examination and survey forms. Price, $3.75.

The balance sheet of industrial health is under scrutiny in this monograph of 224 pages. Directors of industrial relations, industrial physicians, and management will find the treatise useful in evaluating the industrial health program in their establishments and in planning for new and extensive programs to promote preventive and curative industrial medicine. The author lists categorically the objectives of industrial health practice and what can be accomplished by an adequate program of industrial health supervision.

Fifteen chapters, ranging from the evolution and organization of an industrial health service to specific functions of its component parts, and an appendix containing 24 selected model examination and industrial survey forms, make up this volume.

The section on health service for small plants describes how industrial medical supervision may be purchased for these groups, with special reference to the Philadelphia Plan, the details of which are outlined.

" Health Procedures Needing Greater Application in Industry " discusses the advantages derived from the competent preëmployment physical examination program, adequately administered, the importance of the periodic examination, the supervision of the correction of physical defects, and first aid to minor illnesses and accidents.

In the chapter comparing occupational with non-occupational illnesses suggestions are given regarding the control of diseases not directly attributable to industry.

The author undertakes to outline some of the more important conceptions and to offer tentative suggestions for a practical approach to the solution of the problems of fatigue, posture, noise, nutrition, mental hygiene, absenteeism, recreation, ventilation, and illumination. At best the material " merely serves the purpose of guiding the reader."

The chapter on " Administration " is followed by sections which designate the qualifications and duties of the industrial physician and the industrial nurse.

Under the caption " Does Industrial Health Work Pay?" there is a series of examples to prove that it does. The question and answer method is used to prove further the value of industrial health services.

A summary of the material is in-

cluded in the section on general conclusions. Listed also are sources " from which information may be derived regarding industrial health problems and their solutions."

Throughout the author keeps before the reader the values that are recorded on the right hand side of the ledger, and states: " Industrial health work has and will continue to pay dividends upon whatever basis one may choose to calculate them—but the most important of these are human dividends."

Although no bibliography is given the author quotes (with due credit) freely from writings of eminent industrial physicians, industrial hygienists, and others. Specific references and an index would have enhanced the value of the book. BERNARD S. COLEMAN

Protozoology—*By Richard R. Kudo (2nd ed.). Springfield, Ill.: Thomas,* 1939. 676 pp. Price, $6.50.

The first edition of this book appeared in 1931 under the title, " Handbook of Protozoology." The author is Associate Professor of Zoölogy at the University of Illinois. The book has been completely rewritten and increased in length by 225 pages. It is illustrated by 291 etchings showing 2,711 figures of protozoa. It is intended as a textbook, laboratory manual and reference. The first 6 chapters, covering 170 pages, deal with the introduction, ecology, morphology, physiology, reproduction, variation and heredity of protozoa. The remaining 37 chapters are devoted to taxonomy with concise discussion of the biology and development of the various families, genera, and species of the free-living and parasitic protozoa.

Although the book is intended primarily for students of general protozoölogy, it will make a ready reference manual for laboratory workers who may wish to identify protozoa encountered in ecological studies in the field of public health.

The illustrations are of a very high order, many being original and the others taken from authoritative sources. Each chapter is followed by a short list of important and up-to-date references and there is an extensive index. The book is excellent in its entire make up.
HENRY E. MELENEY

Venereal Diseases: Diagnosis, Treatment and Laboratory Methods —*Department of Pensions and National Health, Toronto, Canada,* 1938. 93 pp.

This pamphlet, or manual, of 93 pages, was compiled by the Medical Committee convened by The Health League of Canada. It opens with a chapter on Public Health Aspects, which aims to define the problem quantitatively, on the basis of surveys and hospital records. About 2 per cent of the population is infected with syphilis (about the same as the white population of the United States), and the prevalence of the disease is definitely on the decline. It is less optimistic, statistically, about gonorrhea, but expresses confidence that the free and adequate provision of treatment must eventually have its influence upon the prevalence of that disease also.

There appears to be the same confusion of laws in the several provinces as exists in the states, and their provisions are, on the whole, similar to those in the states.

The descriptions of syphilis and gonorrhea, and of their diagnosis and treatment are good. Physicians in the United States who have learned to accept the treatment schedules advocated by the Coöperative Clinical Group would be upset by the " Continuous Method " of treatment (arsenical and bismuth concurrently for the greater part of the time), and would consider the " Intermittent Method," or " Harrison Method," as rank therapeutic heresy. They would also be at least slightly astonished at the advice that a

little over 7 months of treatment is adequate in the sero-negative primary case, and a little over 13 months, with rest periods toward the end, sufficient for sero-positive primary and secondary cases which have negative blood tests at the end of that time. The dose of bismuth (2.4 gr.) is a little high according to practice in this country. Caution against the over-treatment of the Wassermann-fast infection (spinal fluid negative) meets with our approval. Two grams of Tryparsamide is considered the maximum dose.

A stain for *Treponema pallidum* (Fontana's silver stain) is advocated if darkfield facilities are not at hand, and when no laboratory facilities are available, the indirect capillary method is advocated.

The treatment of gonorrhea in both male and female, according to pre-sulfonamide methods, or for chemotherapeutic failures, cannot be quarrelled with. Since the document was published in 1938, the section on sulfanilamide is not up-to-date and does not consider any of the newer sulfonamides. It is gratifying to note that culture of the gonococcus is considered, throughout, as an essential criterion of cure, and, in chronic infections in the male and most infections in the female, a necessary diagnostic procedure.

Ballinger's Sealed-In Treatment for the abortive treatment of gonorrhea, which "has met with success in thousands of cases," is unfamiliar on this side of the boundary.

The pamphlet will be of use to physicians, laboratory personnel, clinics, hospitals, institutions, and medical students. It will be particularly useful because it has the brevity of a working manual and none of the confusion of an all-inclusive textbook. N. A. NELSON

High Schools and Sex Education—*By Benjamin C. Gruenberg, with the assistance of J. L. Kaukonen. Washington: U. S. Public Health Service*, 1939. 110 pp. Price, $.20.

A revision of a book with the same title published by the U. S. Public Health Service in 1922. It is essentially a manual for high school teachers and administrators with a broad concept of the subject. The suggested modern methods of correlation with the high school curriculum shows an intimate knowledge of the present-day high school.

Qualifications and preparation of teachers has a very prominent place. The qualities essential for a teacher involved in this work are outlined. There are many good suggestions for the preparation of teachers now in service.

The major part is given to "Sex Education in the Subjects of the Curriculum." Here are detailed suggestions for the inclusion of the proper information, attitudes and concepts of the place of sex in the life of a normal adult through Biology, General Science, Physiology and Hygiene, Home Economics, Social Studies and English.

There are reading lists for teachers, administrators, and students. Reliable sources of pamphlets and visual aids are listed. An interesting and unusual section is "Suggested Outline of a Course for Teachers on Sex Education in Secondary Schools." By means of this course an individual or group can make adequate preparation for sex education.

Recognition that the constant social, psychological, emotional, and religious problems of sex are perhaps more troublesome than the purely physical aspect brings the authors to recommend a broad school program rather than an occasional lecture by outside speakers. This book may be used by public health officials who wish to encourage high schools to introduce sex education.

P. K. HOUDEK

Elements of Sanitation—*By Edward S. Hopkins. New York: Van Nostrand,* 1939. 435 pp. Price, $4.00.

Designed as a text for college students, health officers, and public health nurses, this book was prepared with the assistance of 12 specialists in the field of sanitation and hygiene. It is divided into 12 chapters which discuss the scientific background of sanitation, the meaning of determination of pH, water and sewage disinfection, public water supplies, sewage disposal, stream pollution and trade waste disposal, refuse disposal, the essentials of food sanitation, milk sanitation, ventilation and air conditioning, swimming pool control, and environmental hygiene.

In reading a book of this type anyone in the field of public health or sanitation will feel that his particular specialty has been slighted at the expense of other, less important matters. It is believed that there should have been at least some mention of sanitation facilities for camps and institutions at the expense of, say, the comparatively long explanation of pH.

As a text, it would appear desirable to credit the authors with their chapters, provide a more extensive list of references, increase the usefulness of the subject index by providing more items, and eliminate the several errors in spelling and data, and fill omissions.

In the hands of an experienced instructor, the book should be a useful tool in teaching the elements of sanitation.

F. J. MAIER

A Survey of Mouth Hygiene Programs for School Children. *Section V, Cities of 25,000 to 50,000 Population. Cleveland, Ohio: Cleveland Child Health Assn.,* 1939. 201 pp. Price, $.75 per Section.

This is the last Section of the Survey of Mouth Hygiene Programs for school children in American cities, conducted under the Cleveland Child Health Association by Harris R. C. Wilson, D.D.S. It will be remembered that Section I covered 13 cities of over 500,000 population; Section II, 38 cities of 150,000 to 500,000 population; Section III, 42 cities of 100,000 to 150,000 population; and Section IV, 98 cities of 50,000 to 100,000 population.

The Preface by Dr. Wilson expresses regret that the material is almost 2 years old, due largely to the ever changing programs and the practical impossibility of keeping them up to date. He suggests a repetition of the survey after a few years.

Every effort has been made to have the figures as accurate as possible and they may be accepted as such. However, responsibility cannot be assumed for entire accuracy by The Cleveland Child Health Association.

Mouth hygiene is about 40 years old in the United States. The writer of the Preface says " Most of us are groping in the dawn, trying one method and then another in our efforts to discover the way out of a serious dilemma."

All interested in mouth hygiene owe a debt of gratitude to the Cleveland Child Health Association and to Dr. Harris R. C. Wilson, who has carried out this extensive and valuable survey of conditions in the United States.

MAZŸCK P. RAVENEL

Supervision in Public Health Nursing—*By Violet H. Hodgson, R.N. New York: The Commonwealth Fund,* 1939. 376 pp. Price, $2.50.

Here is the book public health nurses have been looking for. We no longer have to depend on texts written for teachers or social workers for our only authority on this subject.

We have here, too, recognition of the fact that there is a great body of supervisors employed in such agencies as county, state, and municipal health departments; in school health departments; in industry; as well as in visit-

ing nurse associations whose technics, procedures, and methods have rightly set the standards for us in the past.

In this day of rapidly rising professional requirements for all types of public health nurses, it is wholesome to have one of the early chapters emphasize the personal qualifications which should form the basis of the good supervisor, who leads by inspiration instead of by authority, and whose leadership is characterized by friendliness, emotional stability, initiative, judgment, and sustained interest.

The current confusion about the duties and interrelationships of generalized supervisors and specialized consultants, and the possibilities and future development or trends in each, furnish some of the most vital information in the book. This also is true of the excellent diagrams showing graphically the three principles of organization and how they function in various types of agencies carrying on public health nursing.

It is difficult to conceive of a more useful or a more timely book than this for all the coördinative and "line" personnel of any agency employing public health nurses. This includes health officers, medical directors of industrial concerns, and school health departments, personnel relations managers and principals and superintendents of schools.

Written by a public health nurse eminently fitted by the variety and type of her experience to be a real authority, this is one of the most significant books on public health nursing in several years.

EVA F. MACDOUGALL

The Child in the Home—*By Leila Wall Hunt. New York: Prentice-Hall*, 1939. 259 pp. Price, $2.50.

This is a book intended, as the preface says, primarily as a text for a general course in child care and development in a college or university. It is written by a nutritionist experienced in teaching students of college age. As is natural, considering the author's background, it stresses nutrition and details of feeding: 8 of the 14 chapters deal wholly or in part with nutritional factors and the appendix is on diets. As a matter of fact this seems like a pretty sound idea. Then there is an excellent chapter on education for parenthood, and a common sense one on habit training for children. A good bibliography follows each chapter.

The section on common pregnancy disorders seems out of line with the rest of the book. The care of the prospective mother is as much a medical responsibility as are children's diseases which are wisely omitted from consideration.

MERRILL E. CHAMPION

Bulletin of the Health Organisation of the League of Nations. Vol. VIII, Nos. 1–2, 1939—*New York: Columbia University Press*, 1939. 386 pp. Price, $1.30.

This issue of the *Bulletin* contains a report of the work of the Health Organisation between June, 1938, and April, 1939, and on the 1939 program. The 3 year plan of the committee runs through 1939 and its results are not yet available. The committee states, however, that its program is being steadily and systematically carried into effect and in accordance with the general ideas on which it is based. The reports are in summary and they do not lend themselves to review.

The issue contains an article on Health Indices, discussing their place in public health reports, and the framework of a skeleton standard report. There is a report on Rural Housing and Planning. By far the larger part of the volume (200 pages of text and 40 pages of reference) is given to Leptospiroses, most of which has special reference to the Netherlands. The whole volume is interesting.

MAZŸCK P. RAVENEL

Educational Psychology, Personality and What Shapes It—*By Daniel Wolford La Rue. New York: Nelson,* 1939. 397 pp. Price, $2.50.

"To serve the practitioner in child culture," is the purpose of *Educational Psychology*. The central problem as formulated by the author in his preface is: "given, a child, how diagnose his personality and make a plan for developing him, achieving his best possible future?"

A few chapters are devoted to the first half of this problem: an analysis of the components of personality and their diagnosis, viz., the propensities, talents, intellectual factors, and bodily organization which make up "X," the child. Succeeding chapters deal with the questions of inherited and acquired traits, maturation, conditioning, motivation and the laws of learning; at which point the author turns his attention to the second half of his problem: the "plan for developing 'X.'" In 5 chapters he discusses the psychology of subject matter, formulating 5 lessons which "X" needs to learn, namely those for Skill, Information, Thought, Sentiment (and Conduct), and Creation. For the teaching of each of these lessons an "efficiency formula" is given which is a rough general plan of attack.

The author then concentrates his attention again on "X," discussing the conditioning of the propensities, the training of talent, the "education" of intelligence, and the conditioning of the body. He concludes with a chapter on the teacher's personality in its relationship to her task, and with a brief discussion of educational measurement.

One wishes that the author resorted a little less frequently to colloquialisms —the lingo of the athletic field is at times a bit annoying in the treatment of a scientific subject. Furthermore, the reviewer finds that the multiplicity of illustrations tends to confuse rather than to illuminate his thought. Perhaps the book is being regarded too much from the standpoint of a clinician who is accustomed to searching out and describing facts unadorned. Perhaps this is why the treatment of psychological tests, educational disability, and mental measurement in general, seems very cursory and incomplete.

The book is to be commended, however, for its analysis of the teacher's job, and for the importance attributed to her own personality in developing the budding personalities in her charge. As a practical guide for the student with little psychological background, it will serve a good purpose, for, in Gesell's words, "the first and almost the last task of the teacher is to understand the child."

J. J. CARLSON

Vitamin D — Chemistry, Physiology, Pharmacology, Pathology, Experimental and Clinical Investigations—*By C. I. Reed, Ph.D., H. C. Struck, Ph.D., I. E. Steck, M.D. Chicago: University of Chicago Press,* 1939. 389 pp. Price, $4.50.

Investigators in the science of nutrition can point with pride to their many outstanding achievements during the past decade. Public interest in the subject of vitamins is in itself tacit testimony to the rapid spread of knowledge on substances which only a short time ago were still laboratory curiosities. Of the already large and rapidly expanding family of vitamins, perhaps none has had a more dramatic background or has received more widespread public attention than vitamin D. The prodigious increase in popularity of vitamins has raised a host of questions regarding their use, misuse, and proper therapeutic applications. Nowhere is this more strikingly manifested than in the case of vitamin D.

Accordingly, this timely monograph by Reed and his associates will receive

an enthusiastic reception by investigators in the field of medicine and its allied branches, students of nutrition and biochemistry, teachers and public health workers alike. Its 389 pages of text, liberally interspersed with illustrations and tables and with a bibliography of 912 references arranged alphabetically according to authors, offers a provocative and stimulating treatise on recent experimental and clinical researches on vitamin D.

According to the authors, " We have not made any pretense of a complete review of the literature, but rather have devoted the work mainly to discussion and tentative interpretation of the more recent literature and integration with the results of the investigations which have occupied our attention since early in 1929." The book was not intended as a text, for the matter-of-fact style of prosaic textbooks is notably absent, nor does it pretend to offer a final solution to any of the many perplexing problems associated with the mode of action or metabolic effects of vitamin D. Rather it presents an intriguing progress report of the more recent developments in this rapidly changing field. In attaining its professed aims, this book has been admirably successful.

Several chapters discuss the chemistry and physiology of vitamin D and related compounds, its relation to rickets, and the various methods of its determination. These discussions center around the characteristic responses associated with the use of physiological amounts of vitamin D. The chapters following consider the use of vitamin D in pharmacological amounts and its less well understood effect on blood constituents, on the parathyroids, on resistance to infection, on mineral metabolism. The special sections dealing with the use of massive doses of vitamin D in the treatment of arthritis and in other therapeutic applications will be particularly stimulating to clinicians and to students of experimental medicine. The fact that case histories of nearly 1,000 human subjects were studied, to whom large doses of vitamin D had been given over a period of years with no fatalities, nor any evidence of chronic injury when toxicity was not observed, offers convincing proof of the relative harmlessness of vitamin D when used in recommended dosages. The threshold of intoxication for human subjects appears to be about 20,000 units per kilogram of body weight.

This authoritative, well written book, by men renowned for their original researches in this field, is a welcome and invaluable contribution to a subject which is destined to hold the spotlight of public attention and scientific inquiry for many years. JAMES T. LOWE

Pathogenic Microörganisms — A Practical Manual for Students, Physicians and Health Officers— *By William H. Park, M.D., and Anna W. Williams, M.D. (11th ed. rev.). Philadelphia: Lea & Febiger,* 1939. 1056 pp. Price, $8.00.

The 11th edition of this excellent book upholds the high standard of its predecessors. It continues to be one of the best for use by students of medicine and public health. As in previous editions the historical background of the discovery and development of our knowledge of the various organisms is sketched. The book continues to stress epidemiological data and laboratory methods of diagnosis of the various diseases helpful not only to the medical student but also to those especially interested in preventive medicine and public health. This new edition has been kept thoroughly up to date.

The filterable viruses in general are adequately treated although certain diseases due to them are given rather scanty attention in comparison to their importance and our knowledge of them. The chapter on influenza gives a com-

prehensive summary of our present knowledge on this subject.

Additional matter on the Rickettsia diseases might well have been included, as only 6 pages are given.

It is stated that Rocky Mountain spotted fever is restricted chiefly to the northwestern part of the United States. Recent data show this no longer holds true, for during the years 1933–1937, 27.4 per cent of all the cases reported in the United States occurred in the South Atlantic States. *Dermacentor andersoni* is the only tick given as transmitting this disease, no mention being made of the importance of *Dermacentor variabilis* as a vector on the Eastern Seaboard.

The chapters on malaria as well as those on the intestinal protozoa are concise and well illustrated.

A few misprints were noted, such as " North Border " for " North Brother " Island. Maurer's is misspelled Maurrer's.

The book maintains its high standard of make-up, is well printed, and admirably illustrated.

HAROLD W. BROWN

The Phosphatase Test for Control of Efficiency of Pasteurization—*By H. D. Kay, R. Aschaffenburg, and F. K. Neave. Shinfield (near Reading), England: Imperial Bureau of Dairy Science,* 1939. 54 pp. Price, $.75.

The article is a critical review of the phosphatase test, covering completely its development, modifications, and application to milk and various milk products. It summarizes the results obtained by various investigators, pointing out the advantages and limitations of the test, the sensitivity, and effect of various factors such as storage, preservatives, bacterial contamination, stage of lactation, and mastitis on its reliability.

The conclusions are that the test for milk is very sensitive, accurate, and effective in controlling the efficiency of pasteurization by the " holder " process. The test in its appropriate modification is sufficiently sensitive to detect a drop in temperature of 1.0 to 1.5° F. if pasteurizing temperature is 143° F. for 30 minutes. If 145° F. for 30 minutes, a drop of 1.5° F. can be detected.

A reduction of 10 minutes in holding time can be detected, but not 5 minutes with certainty.

The presence of 0.2 to 0.25 per cent of raw milk in pasteurized product can be detected and in many instances even smaller amounts.

Regarding the application of the test to the high temperature short time holding process it is concluded that, " the claim that the phosphatase test remains sensitive under H.T.S.T. conditions is well founded, but further experimental evidence is required to settle a number of details." Also, that the accuracy of the test when applied to products other than milk is still disputed, and further investigation is required with reference to amount of sample to be used for testing, limiting color standards, etc.

It is confidently expected that further research will achieve tests for milk products which will be as accurate and reliable for controlling the pasteurizing process as that already achieved for milk.

An appendix gives precautions and detailed instructions for performing the prosphatase test. Technic for the following, and modifications are given:

A. Kay-Graham Test A and Test B
B. Neave's Modification
C. Gilcreas and Davis Modification
D. Scharer's Modification
 1. Laboratory Test
 2. Field Test
E. Leahy's Modification
F. Aschaffenburg and Neave's Modification

L. H. BURGWALD

Maternal Care and Some Complications—*Edited by F. L. Adair, M.D. Chicago: University of Chicago Press*, 1939. 194 pp. Price, $1.50.

This helpful handbook in essence is a combination of the material published in two former manuals under the titles *Maternal Care* and *Maternal Care Complications*. It makes available in concise form the fundamental principles of prenatal, intrapartum, and postpartum care. Particular stress is laid upon prevention of complications. It is evident that if the directions given in this little volume are carefully carried out, there would follow not only a reduction in maternal mortality and morbidity but a considerable lessening of the number of stillbirths and neonatal deaths. This manual can be highly recommended to physicians, nurses and others having anything to do with the puerperal woman.

RICHARD A. BOLT

BOOKS RECEIVED

A DOCTOR'S HOLIDAY IN IRAN. By Rosalie Slaughter Morton. New York: Funk & Wagnalls, 1940. 335 pp. Price, $3.00.

MIND EXPLORERS. By John K. Winkler and Walter Bromberg. New York: Reynal & Hitchcock, 1939. 378 pp. Price, $3.00.

NURSING AS A PROFESSION. By Esther Lucile Brown. 2d ed. New York: Russell Sage, 1940. 157 pp. Price, $.75.

PRACTICAL FOOD INSPECTION. By C. R. A. Martin. Vol. I. MEAT INSPECTION. 2d ed. 316 pp. Price, $3.75. Vol. II. FISH, POULTRY AND OTHER FOODS. 2d ed. 284 pp. Price, $3.00. London: Lewis, 1940.

CONGENITAL MALFORMATIONS. By Douglas P. Murphy. Philadelphia: University of Pennsylvania, 1940. 98 pp. Price, $2.00.

YOUR CHILD'S DEVELOPMENT AND GUIDANCE TOLD IN PICTURES. By Lois Hayden Meek. Philadelphia: Lippincott, 1940. 166 pp. Price, $2.00.

HOSPITAL BOOK GUIDE. Vol. 1, No. 1. Chicago: American Library Association, 1940. 18 pp. Published quarterly. Subscription $1. per year. Single copies, 35¢.

ALL THE WORLD TO SEE! Twenty-fifth Annual Report of the National Society for the Prevention of Blindness, Inc. New York, N. Y. 1939. 12 pp.

THE SCIENCE OF PSYCHOLOGY. By Raymond H. Wheeler. 2d ed. New York: Crowell, 1940. 436 pp. Price, $2.75.

MANUAL OF INDUSTRIAL HEALTH HAZARDS. By Joseph B. Ficklen. West Hartford: Service to Industry, 1940. 176 pp. Price, $4.00.

A CHECK LIST FOR THE SURVEY OF HEALTH AND PHYSICAL EDUCATION PROGRAMS IN SECONDARY SCHOOLS. By Terry H. Dearborn. Stanford University Press, Calif., 1940. 23 pp. Price, $.60.

HOUSEHOLD HYGIENE. By J. C. Geiger. San Francisco: Department of Health, 1940. 96 pp.

LET'S TALK ABOUT YOUR BABY. By H. Kent Tenney. 2d ed. rev. Minneapolis: University of Minnesota Press, 1940. 115 pp. Price, $1.00.

DIABETES: PRACTICAL SUGGESTIONS FOR DOCTOR AND PATIENT. By Edward L. Bortz. 2d ed. rev. Philadelphia: Davis, 1940. 296 pp. Price, $2.50.

A SELECTED PUBLIC HEALTH BIBLIOGRAPHY WITH ANNOTATIONS

RAYMOND S. PATTERSON, PH.D.

Case Finding by Roentgenogram —Primary tuberculosis infection in adults usually gives rise to no symptoms, then it proceeds to a spontaneous healing which cannot be hastened by any treatment or retarded by unhygienic conditions. Such a happy outcome may not be anticipated for the secondary lesion: this is the one that must be found early and treated adequately. Detecting the early secondary lesion is not easy. Case finding becomes more complex.

BRAHDY, L. Tuberculosis Case Finding. Indust. Med. 9, 3:139 (Mar.), 1940.

Who Was Sick and with What—In a nation-wide sickness canvass, 4½ per cent of the people were laid up on the day of the canvass, 18 per cent had a chronic condition or impairment. Respiratory diseases were most common, but cardiovascular diseases caused more disability. Half the chronic cases were under 45. There is a great deal more here, which all should know.

BRITTEN, R. H., *et al.* The National Health Survey. Pub. Health Rep. 55, 11:444 (Mar. 15), 1940.

An Important Last Step—Many health workers in addition to those engaged in tuberculosis control will welcome this detailed statement of methods by which suitable tuberculous patients may be given the advantage of rehabilitation.

COPP, T. Federal and State Programs of Vocational Rehabilitation. Am. Rev. Tuberc. 41, 2:246 (Feb.), 1940.

Less Than 10,000 Maternal Deaths —Better maternal care is being rewarded by a marked improvement in the maternal death rates. But they are still far too high. Birth rates were up and maternal mortality down in 1938.

DAILY, E. F. Maternal Mortality, 1938. J.A.M.A. 114, 11:960 (Mar. 16), 1940.

Wastage in Child Life—Nearly a quarter of a million American children die annually. Thirty-seven different conditions, causing more than half of these deaths can be prevented if the public will utilize treatment facilities already, or being, provided—especially for prenatal and natal care.

DAVISON, W. C. Preventive Pediatrics. J.A.M.A. 114, 9:742 (Mar. 2), 1940.

"Ask-me-another" — The "Quiz-program" technic plus supplying the correct answers is suggested as an inexpensive, practical health educational device. It worked at the fair.

DERRYBERRY, M., and WEISSMAN, A. Using Tests as a Medium for Health Education. Pub. Health Rep. 55, 12:485 (Mar. 22), 1940.

Background for Health—Health is often treated as an extra-curricular activity, a little more refined than football, but not so interesting. Health education requires more than facts of life for it depends upon medical understanding. It is not a matter of loose thinking, or opinion; it is a matter of knowledge. These gems are a few of the many in this abstract of an address.

HAGGARD, H. W. Educational and Personal Health. J. School Health. 10, 3:80 (Mar.), 1940.

Interns and Tb.—Tuberculous infiltration of the lungs, in most instances asymptomatic, was found in 18 per cent of the examined medical students in

one school of medicine. But physicians do not have clinical tuberculosis in greater proportion than laymen, and their mortality is relatively low. It would seem that physicians are willing to practise what they preach.

HETHERINGTON, H. W., and ISRAEL, H. L. Tuberculosis in Medical Students and Young Physicians. Am. J. Hyg. 31, 2:45 (Mar.), 1940.

School Children and Tb.—Reporting upon the 10 year tuberculosis case finding program in Massachusetts, the principal conclusion is that no differences existed in the incidences in boys and girls. Reaction rates are not indicative of relative susceptibility, and the usual upward trend in reaction percentages in the higher school ages was found.

HUTCHINSON, E. P., and POPE, A. S. Tuberculosis among Massachusetts School Children. Am. J. Hyg. 31, 2:62 (Mar.), 1940.

Air-Borne Germs—Studies of the air in operating rooms suggest that the bacterial content varies with the number of the people in the room and their activities. The infection of clean wounds from this source cannot be ignored.

MACDONALD, K. A Quantitative Bacterial Analysis of the Air of Operating and Delivery Rooms and Related Areas of a General Hospital. Am. J. Hyg. 31, 2:74 (Mar.), 1940.

Recording Who Gets What Care—For small health departments an individual index card is recommended. Its many uses are pointed out.

MOUNTIN, J. W., and FLOOK, E. The Place of the Index in Health Department Record Keeping. Pub. Health Rep. 55, 10:387 (Mar. 8), 1940.

Making the Most of Educational Opportunities—We train women to be nurses, then appoint them public health nurses and expect them to be teachers! The adequacy of teaching in the field is discussed in illuminating detail; and some suggestions are given about ways to improve the whole educational program.

MOUNTIN, J. W. Our Verbal Public Health Activities. Pub. Health Rep. 55, 8:323 (Feb. 23), 1940.

Pills vs. Protective Foods—It is to be regretted that, appearing as it does in a British health publication, so few expectant authors who are preparing to bear down on the audiences of the Detroit Annual Meeting will have an opportunity to see this perfectly swell example of how to prepare a sprightly public health paper.

POND, H. The Nutrition of the Expectant Mother from the Point of View of the Administrator. J. Roy. Inst. Pub. Health & Hyg. 3, 3:75 (Mar.), 1940.

Discovering Health Motives—Words of profound advice offered to the teacher of health in the classroom apply equally to the problem of the health educator of the public—as who of us isn't?

ROGERS, J. F. Incentives and Methods in Health Education. J. School Health. 10, 3:65 (Mar.), 1940.

Cancer Can Be Cured—Ontario has seven well equipped diagnostic and treatment centers for cancer, which are being widely used by patients referred by one of every four physicians in the province. Not much evidence is found to indicate earlier diagnosis through this service.

SELLERS, A. H. The Contribution of the Ontario Cancer Clinics to the Control of Cancer. Canad. Pub. Health J. 31, 2:72 (Feb.), 1940.

What the Public Should Know about Measles—A "measles issue" of Neighborhood Health presents some excellent papers for popular consumption.

SMITH, C. H. Measles—Its Prevention and Its Treatment (and five related papers). Neighborhood Health (New York City Dept. of Health). 6, 2:1 (Mar.), 1940.

Bundle of Reeds Makes Firm Staff—Team work is urged for health education to earn public support and the patient's coöperation in the tuberculosis control program. With a minimum of adaptation the same formula can be applied to every other public health administrative project.

VAUGHAN, H. F. Tuberculosis Control. Am. Rev. Tuberc. 41, 2:232 (Feb.), 1940.

When Eskimos Eat Lollipops—In the Eskimo, at any rate, the eating of refined sugar initiates and causes an increase in the growth of oral lactobacilli and also increases the incidence of dental caries. "Natural" sweets—raisins, prunes, honey—were found blameless.

WAUGH, B. B., and WAUGH, L. M. Effects of Natural and Refined Sugars on Oral Lactobacilli and Caries among Primitive Eskimos. Am. J. Dis. Child. 59, 3:483 (Mar.), 1940.

Year — 1939: Blood Tests — 6,200,000—Progress report on the control of syphilis and gonorrhea since the advent of Dr. Parran's famous article in the July, 1936, Survey Graphic.

VONDERLEHR, R. A. Are We Checking the Great Plague? Survey Graphic. 39, 4:217 (Apr.), 1940.

Where Ignorance Isn't Blissful—Most of the many, many things that people don't know about tuberculosis, and many that they know but aren't so, are paraded for us that we may have a little better idea what to do about the deficiencies of human understanding. A stimulating paper.

WHIPPLE, K. Z. W. Tuberculosis Control. Am. Rev. Tuberc. 41, 2:237 (Feb.), 1940.

ASSOCIATION NEWS

SIXTY-NINTH ANNUAL MEETING
DETROIT, MICH., OCTOBER 8–11, 1940
HEADQUARTERS
Book-Cadillac Hotel and Hotel Statler

APPLICANTS FOR MEMBERSHIP

The following individuals have applied for membership in the Association. They have requested affiliation with the sections indicated.

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Engineering Section

Willard J. Cloyes, 8th and Pine Sts., Klamath Falls, Ore., Sanitary Engineer, Klamath County Health Dept.
J. A. Hankins, Jr., Vernon, Ala., Sanitation Officer, Lamar County Health Dept.
D. Webster Jones, B.S., 714 N. Oak St., Little Rock, Ark., Director of Milk Control, State Board of Health
Frederick S. Kent, B.S., W. K. Kellogg Foundation, Battle Creek, Mich., Assistant Engineer
Joseph Maier, Lake City, Mich., Sanitarian, District Health Dept. No. 1
Lester A. Sanger, B.S., in C.E., 436 Sixth St., Traverse City, Mich., Sanitary Engineer, Grand Traverse County Health Dept.
Morris S. Siegel, LL.B., J.D., 116 Temple St., Los Angeles, Calif., Director, Bureau of Housing and Sanitation, City Health Dept.
William M. Sutcliffe, 23715 Cliff Dr., Bay Village, Ohio, Sanitary Engineer, Cuyahoga County Board of Health
Robert O. Sylvester, B.S. in C.E., Cowlitz County Courthouse, Kelso, Wash., Sanitary Engineer, Cowlitz-Wahkiakum Counties
James A. Westbrook, M.S.E., District Health Dept., Chapel Hill, N. C., Sanitary Engineer
Francis H. Woo, B.S. in C.E., 1041 Koko Head Ave., Honolulu, T. H., Junior Sanitary Engineer, Board of Health

Food and Nutrition Section

Lillian Brinkman, M.A., Hotel Whitcomb, San Francisco, Calif., Chief, Nutrition Services, State Dept. of Public Health
Lloyd A. Hall, B.S., 1415 W. 37th St., Chicago, Ill., Chief Chemist, The Griffith Laboratories
Christine A. Heller, M.S., 651 Canyon Rd., Santa Fe, N. M., Nutrition Consultant, State Dept. of Health
John C. Sluder, A.B., 9 Willow St., Boston, Mass., Research Assistant, Massachusetts Institute of Technology

Maternal and Child Health Section

Robert Grosso, D.D.S., 101 Grove St., San Francisco, Calif., Director, Dental Bureau, Dept. of Public Health
Robert Jonitz, M.D., 153 S. Grove St., East Orange, N. J., Infant Welfare Physician, Health Dept.
Emily J. Mosford, B.S., R.N., Div. of Child Hygiene, State Dept. of Health, Minneapolis, Minn., Nurse Instructor
Walter H. Phillips, D.D.S., M.S.P.H., 3919 John R. St., Detroit, Mich., Director, Dental Division, Dept. of Health
Charles L. Wilbar, Jr., M.D., 3746 Lurline Dr., Honolulu, T. H., Director, Bureau of Maternal and Infant Hygiene, Board of Health
Edith F. Young, M.D., Sonoma, Calif., Pediatrician, Bureau of Child Hygiene, State Dept. of Public Health

Public Health Education Section

Charles E. Ballard, M.D., Warm Springs, Ore., Field Physician, Warm Springs Indian Reservation
Lyle G. Phillips, M.D., Hotel and Miller Sts., Honolulu, T. H., Member, Territorial Board of Health
Louis B. Slifkin, D.D.S., 9 N. Broad St., Trenton, N. J., City Dentist
Durward L. Stowe, M.A., Box 18, Tennessee Polytechnic Institute, Cookeville, Tenn., Professor of Health Education
Edith M. Tetlock, R.N., 9257 Littlefield Ave., Detroit, Mich., Health Educator, Dept. of Health

Public Health Nursing Section

Edna L. J. Cheney, McCracken, Kans., Field Nurse, Kansas Crippled Children's Commission
Cathlena A. Cooper, R.N., B.S., 351 S. Warren St., Syracuse, N. Y., Director, Visiting Nurse Assn.

Goldie M. Davis, M.S., R.N., 722 S. Shipley, Muncie, Ind., Director of Nursing Service, Muncie Visiting Nurse Assn.

Catherine M. Feuerstein, R.N., C.P.H., 927 N. 12th St., Milwaukee, Wis., Assistant Educational Director, Out-Patient Dept., St. Joseph's Hospital

Bertha T. Fradkin, R.N., 650 Main St., New Rochelle, N. Y., Director, New Rochelle Visiting Nurse Assn.

Vera B. Griffin, R.N., 15 Ives St., Beverly, Mass., Field Secretary, Essex County Health Assn., Inc.

Laura N. Hegstad, R.N., B.S., Court House, Mankato, Minn., Advisory Nurse, State Dept. of Health

Mary S. Hull, R.N., Box 711, Santa Fe, N. M., Regional Consultant, Public Health Nursing, State Dept. of Public Health

Margaret T. T. Jagger, R.N., 2301 15th Ave., So., Birmingham, Ala., Supervising Nurse, Jefferson County Health Dept.

Martha R. Jenny, R.N., B.S., 3154 Windberg, Madison, Wis., State Advisory Nurse, Bureau of Public Health Nursing, State Board of Health

Agnes M. Leahy, R.N., 215 Beck St., Akron, Ohio, Local Supervisor, Metropolitan Life Ins. Co.

Lillian M. O'Callaghan, R.N., 106 Warm Springs Ave., Boise, Idaho, State Orthopedic Consultant Nurse, State Div. of Public Health

Lydia Reitz, B.S., R.N., 2651 Gilbert Ave., Apt. 2, Cincinnati, Ohio, Local Supervisor, Metropolitan Life Ins. Co.

Virginia L. M. Robinson, R.N., 334 Boston Post Road, Weston, Mass., Public Health Nurse, Weston Red Cross Public Health Nursing Service

Ione M. Rowley, B.S., R.N., 114 W. Gilman, Madison, Wis., State Advisory Nurse, State Board of Health

Edith Streed, R.N., District Health Office, Valley City, N. D., District Supervisor, Public Health Nursing

Hazel Wedgwood, R.N., 36 Hancock St., Boston, Mass., Director of Public Health Nurses, Boston Health Dept.

Clara Wilson, B.S., R.N., 141 Belleview Drive, San Leandro, Calif., Public Health Nurse, Alameda County Health Dept.

Elva A. Wright, M.D., 6340 Brompton Rd., Houston, Tex., Physician

Epidemiology Section

Herbert I. Arbeiter, B.S., 940 Winona St., Chicago, Ill., Student, Univ. of Illinois

Nicholas P. Cosco, M.D., 29 Railroad Ave., Middletown, N. Y., Physician

J. K. Deegan, M.D., H. M. Biggs Memorial Hospital, Ithaca, N. Y., Superintendent

Oscar M. Elkins, M.D., 140 Pacific St., Ocean Park, Calif., Social Hygiene Physician, Los Angeles County Health Dept.

Jose D. Rojas Franky, M.D., 50 Haven Ave., New York, N. Y., Student, DeLamar Institute of Public Health

Ida Levin, M.S., 118 Millard Hall, Univ. of Minnesota, Minneapolis, Minn., Graduate Student

Harold J. Sacks, 540 Briar Place, Chicago, Ill., Student, Univ. of Illinois

Unaffiliated

Henry M. Bockrath, M.D., 1259 14th Ave., San Francisco, Calif., Clinician, State Dept. of Public Health

William T. Dunn, M.D., Front St., Lahaina, Maui, Hawaii, Acting Assistant Surgeon, U. S. Public Health Service

Eugene Flint, A.B., Room 105, Capitol Annex, Phoenix, Ariz., X-ray Technician, Arizona State Board of Health

Frank E. Gallison, M.D., 214 Riverway, Boston, Mass., Student, Harvard Univ.

Earl C. Gluckman, M.D., 57 Locust Hill Ave., Yonkers, N. Y., Student, DeLamar Institute of Public Health

Julius A. Hene, M.D., 311 W. 19th St., New York, N. Y., Student, DeLamar Institute of Public Health

DECEASED MEMBERS

I. W. Knight, M.D., Dr.P.H., Pitman, N. J., Elected Member 1916

James Roberts, M.D., Hamilton, Ontario, Can., Elected Member 1907, Elected Fellow 1922

A. C. Stokes, M.D., Omaha, Nebr., Elected Member 1928

Robert H. Trimble, M.D., London, Ohio, Elected Member 1938

CLOSING DATE FOR SUBMITTING FELLOWSHIP APPLICATIONS

MEMBERS who may be interested in applying for Fellowship in the A.P.H.A. are hereby advised that August 1 is the latest date on which Fellowship applications can be accepted for 1940 election.

HEALTH CONSERVATION CONTESTS

WINNERS IN THE ELEVENTH ANNUAL CITY HEALTH CONSERVATION CONTEST

GROUP I (cities over 500,000 population)—Milwaukee, Wis., wins the first award. An award of merit in this population group goes to Baltimore, Md.

GROUP II (cities of 250,000 to 500,000 population)—Memphis, Tenn., is the winner. Awards of merit in this group go to Louisville, Ky., Newark, N. J., Dallas, Tex., and Toledo, Ohio.

GROUP III (cities of 100,000 to 250,000 population)—First awards were given to both New Haven and Hartford, Conn. Awards of merit go to Grand Rapids, Mich., Yonkers, N. Y., Reading, Pa., Springfield, Mass., and Erie, Pa.

GROUP IV (cities of 50,000 to 100,000 population)—The winner is Newton, Mass. Awards of merit go to Evanston, Ill., Schenectady, N. Y., Pasadena, Calif., Madison, Wis., East Orange, N. J., Racine, Wis., and Sacramento, Calif.

GROUP V (cities of from 20,000 to 50,000 population)—First awards were given to both Greenwich, Conn., and Plainfield, N. J. Awards of merit go to Hackensack, N. J., Winona, Minn., Brookline, Mass., Stamford, Conn., and Orange, N. J.

GROUP VI (cities of less than 20,000 population)—The winner is Englewood, N. J. Awards of merit go to Asbury Park, N. J., Hibbing, Minn., and Virginia, Minn.

WINNERS IN THE SIXTH ANNUAL RURAL HEALTH CONSERVATION CONTEST

NORTHEASTERN DIVISION—The winner is Alger-Schoolcraft Health Unit, Mich. Awards of merit go to District 7, Gladwin, Mich., Chippewa County, Mich., District 2, West Branch, Mich., Mecosta-Osceola Health Unit, Mich., Wayne County, Ohio, Saginaw County, Mich., Barnstable County, Mass., Lorain County, Ohio, Berkshire District, Mass.

EASTERN DIVISION—The winner is Fayette County, Ky., and awards of merit go to Montgomery County, Md., Jefferson County, Ky., Scott County, Ky., Arlington County, Va., Mason County, Ky., Prince George County, Md., Anderson County, Ky., and Madison County, Ky.

SOUTHEASTERN DIVISION—The winner is Lauderdale County, Miss., and awards of merit go to Coahoma County, Miss., Charleston County, S. C., Spalding County, Ga., and Adams County, Miss.

NORTH CENTRAL DIVISION—Awards of merit go to Union County, S. Dak., Des Moines County, Ia., Gallatin County, Mont., and Cascade County, Mont.

SOUTH CENTRAL DIVISION—The winner is St. Mary's Parish, La. Awards of merit go to Dallas County, Tex., and Tyler-Smith Health Unit, Tex.

WESTERN DIVISION—The winner is Wasco County, Ore. Awards of merit go to Kern County, Calif., Thurston County, Wash., Jackson County, Ore., Marion County, Ore., and Clallam County, Wash.

SPECIAL AWARDS for having won the Rural Contest twice in their respective geographic districts and for having maintained their previous high standards of achievement during 1939 go to Davidson County, Tenn., El Paso County, Tex., Pike County, Miss., Shawnee County, Kans., and Woodbury County, Ia.

CANADIAN RURAL HEALTH CONTEST—The winner is St. James-St. Vital Health Unit, Manitoba. Awards of merit go to Terrebonne Health Unit, Quebec; Foothills Health Unit, Alberta; Nicolet County Health Unit, Quebec; and Laviolette Health Unit, Quebec.

A SPECIAL AWARD for having won the Canadian Contest twice and for having maintained its previous high standard during 1939 goes to St. Jean-Iberville-Laprairie-Napierville County Health Unit, Quebec.

These contests are conducted annually by the Chamber of Commerce of the United States with the coöperation of the American Public Health Association. The Rural Health Conservation Contest is financed by the W. K. Kellogg Foundation and the City Health Conservation Contest by a group of insurance companies.

and sanitary chemistry; seeks responsible position in laboratory work or teaching of bacteriology, dairy industry or sanitary chemistry. L439

ENGINEERING

Engineer, aged 28, 3 years' experience as district sanitation supervisor, state department of health, together with work on plumbing, heating and ventilation, will consider position in the plumbing and heating field or state department of health. Prefers middle western or western states. E453

Engineer with good training and experience in water treatment, sewage plant operation and in research, wishes position as superintendent. Can go anywhere. E422

STATISTICS

Young Ph.D. (Austrian), single, available for any type of statistical and research work. Highly trained and experienced in applied mathematics, technics of statistical analysis, pictorial statistics, visual education. Also qualified to plan and participate in training of physically disabled. Excellent references both here and abroad. S456

Opportunities Available

DIRECTOR—Well-established visiting nurse association; staff of 16 nurses, 2 supervisors; executive ability and experience public health supervising important; eastern industrial city; $2,800. PH-50, Medical Bureau, Palmolive Building, Chicago.

NURSING SUPERVISOR—Graduate nurse with public health supervising experience to supervise heavy bedside nursing program under guidance executive director; duties begin in September; city of 50,000. PH-51, Medical Bureau, Palmolive Building, Chicago.

PUBLIC HEALTH NURSE—For staff appointment, county health unit; $125 monthly plus $40 automobile allowance; immediately available; midwest. PH-52, Medical Bureau, Palmolive Building, Chicago.

PUBLIC HEALTH SUPERVISOR — Graduate nurse with college degree, degree in public health nursing, and supervising experience in standard public health agency; $160, increasing to $175, plus car allowance; large southern metropolis. PH-53, Medical Bureau, Palmolive Building, Chicago.

COUNTY HEALTH PHYSICIAN—Young physician interested in rural health problems; southerner under 35 with some public health training preferred; training available to young man interested but lacking special work public health; about $225. PH-54, Medical Bureau, Palmolive Building, Chicago.

CITY HEALTH PHYSICIAN — Young man qualified to carry on established health program; staff of 14, annual stipend vicinity $5,000, plus car and car expenses; western town of 25,000. PH-55, Medical Bureau, Palmolive Building, Chicago.

STUDENT HEALTH PHYSICIAN—Four year appointment, combining duties on university health service with training in public health or other specialty; should lead to M.S. degree by end of fourth year; $2,000 increasing by degrees to $3,400; midwest. PH-56, Medical Bureau, Palmolive Building, Chicago.

DIRECTOR—For county health department to be organized in thickly populated section of South, southerner with degree in public health administration and some practical experience in public health problems preferred; initial stipend $4,000—to be increased substantially when department is well organized. PH-56, Medical Bureau, Palmolive Building, Chicago.

Situations Wanted

PUBLIC HEALTH NURSE—B.S. and graduate nurse degrees, state university; year's graduate training in public health nursing; several years' teaching experience; 2 years, supervisor, clinics, university hospital; for further information please write Burneice Larson, Director, Medical Bureau, Palmolive Building, Chicago.

YOUNG LAYMAN—Now completing graduate training in public health, preventive medicine, and bacteriology, is available for public health appointment or one involving public relations; B.S. degree, state university; 8 years' experience as public relations counsel; for further information please write Burneice Larson, Director, Medical Bureau, Palmolive Building, Chicago.

BACTERIOLOGIST—A.B., Ph.D., state university; 6 years, university laboratory for animal pathology; 4 years, parasitologist, state department of public health; for further information please write M. Burneice Larson, Director, Medical Bureau, Palmolive Building, Chicago.

YOUNG PHYSICIAN—Is available for public health appointment; A.B., M.D., eastern schools; M.S.P.H., Michigan; interesting record of successful experience; for further information please write Burneice Larson, Director, Medical Bureau, Palmolive Building, Chicago.

YOUNG PHYSICIAN—Is interested appointment with maternal welfare organization; 4 years' postgraduate work and residencies in obstetrics and gynecology, university medical center; will take American Board examinations upon completion of service in July; for further information please write Burneice Larson, Director, Medical Bureau, Palmolive Building, Chicago.

NEWS FROM THE FIELD

SUMMER SCHOOL COURSES IN PUBLIC HEALTH

While the following list does not show all universities and technical schools offering summer courses in public health, it represents those who have replied to a questionnaire sent out by the American Public Health Association.

American National Red Cross

Courses in Teacher Training for Home Hygiene Instruction:

University of California, Los Angeles, Calif.—July 1–August 9
Colorado State College, Fort Collins, Colo.—July 6–August 16
Peabody College, Nashville, Tenn.—June 10–August 23

University of California, Berkeley, Calif.

July 1–20

Institute on Maternal and Infant Hygiene (for registered nurses):
Public Health Aspects
Medical Problems
Group Discussions

July 1–August 9

General Bacteriology
Child Development
Physiology of the Growth and Development in the Child
Administration of the School Health Program
Health Problems in the Secondary Schools
Child Psychology
Public Health Aspects of Maternal and Infant Hygiene—3 weeks' institute, July 1–July 20—under auspices of University of California and the State Department of Public Health
Introduction to Educational Psychology
General Psychology
Elementary Epidemiology *
Elementary Public Health *

* These two courses are offered in the Intersession, May 20–June 28.

University of California at Los Angeles, Los Angeles, Calif.

July 1–August 9

Elementary Bacteriology
Growth and Development of the Child
Adolescence
Administration of the School Health Program
Social Backgrounds of Child Development
Recreational Leadership
Principles of Teaching as Applied to Home Hygiene Courses
Methods in Teaching Home Hygiene Courses with Practice Teaching
Essentials of Nutrition
Family Relationships
General Psychology
Child Psychology
Educational Psychology
Public Health and Preventive Medicine
Principles and Practice of Public Health Nursing
Social Case Work as Related to Public Health Nursing
General Human Physiology
General Zoölogy
Social Institutions
The Family
Care of Dependents

The Catholic University of America, Washington, D. C.

June 28–August 10

Child Study
Nursing Education
Public Health Nursing
Social Work
Sociology

Colorado State College of Education, Greeley, Colo.

June 17–August 10

(One 4-week session, one 6-week session)

Nursing Education:
- Fundamentals of Community Nursing
- The Curriculum and Principles of Teaching Applied to Nursing Education
- Ward Management and Ward Teaching
- Trends in Nursing Education
- Trends in Guidance
- School Health Education
- State Supervision of Nursing Education
- Administration in Schools of Nursing

Teachers College, Columbia University, New York, N. Y.

July 8–August 16

Administration of Health Education in Public Schools; Principles and Special Problems in Health Education; Methods and Materials of Health Instruction in Schools and Colleges
- Health Education
- Health and Physical Education
- Recreation
- Health Care of Children
- Nutrition and Health
- Personal and General Hygiene
- Public Health Nursing
- Public Health Administration
- School Hygiene
- School Nursing

Education of the Handicapped:
- Demonstration Classes
- Observation, Practice Teaching, and Special Clinical Work
- Survey of Ear, Orthopedic, Cardiac, and Certain Tuberculous Conditions, and of Certain Types of Malnutrition
- Education of the Blind and Partially Sighted (beginning and advanced courses)
- Education of the Deaf (advanced courses only), and of the Hard of Hearing (beginning and advanced courses)
- Education of the Motor Handicapped
- Education of the Mentally Handicapped
- Education of the Socially Handicapped
- Speech Correction for the Handicapped
- Psychology of Physically Handicapped Children
- Music and Rhythms for the Handicapped

Cornell University, Ithaca, N. Y.

July 8–August 16

Health Education:
- The School Health Program
- Mental and Physical Health Problems of the School Child
- Mental Hygiene

University of Denver, Denver, Colo.

June 17–August 23

Conference on Health and Physical Education, June 24, 25, 26

Duke University, Durham, N. C.

June 12–July 23

- Materials and Methods in Health Education
- Mental Hygiene of the School Child
- Personal and School Hygiene

Harvard University—Medical School, Boston, Mass.

June 18–August 2

Physiotherapy (course for graduates)

The University of Hawaii, Honolulu, Hawaii

June 24–August 2

Public Health Nursing:
- Supervision in Nursing
- The Teaching of Health

Physical and Health Education

Principles of Public School Health

University of Illinois, Urbana, Ill.

June 17–August 10

Bacteriology:
- Introductory Bacteriology and Sanitary Science
- Epidemiology

Entomology:
- Destructive and Useful Insects
- Control of Insect Pests

Home Economics:
- Nutrition
- Dietetics
- Foods
- Organization and Management of the Home
- The Child and His Development

Physical Education for Men:
- Physical Education
- Problems in Physical Education
- Problems in School Health

Safety Education
Training and First Aid
Physical Education for Women:
Physical Education
Physical Education Program for the High School
Playground Activities for Elementary Schools
Health Education in the High School
First Aid
Community Recreation
Social Administration:
Recent Developments in Public Welfare Administration
Social Case Work
Child Welfare
Social Case Work with Children

State University of Iowa, Iowa City, Iowa

June 4–August 22

Physical Education for Women
Physical Education for Men
School Health Problems
Therapeutic Exercise
Physiology of Exercise
History and Principles of Physical Education
Tests and Measurements in Physical Education
First Aid to the Injured
Club and Camp Leadership
Play and Recreational Leadership
Administration of Physical Education

University of Kentucky, Lexington, Ky.

June 17–August 16

School for Public Health Workers (Health Officers, Sanitarians, Nurses):
Biostatistics
Health Administration
Epidemiology
Maternal and Child Health
Chemistry of the Vitamins
Mental Hygiene
Government and Public Health
Public Health Bacteriology
Sanitary Engineering
Public Health Nursing
General Psychology
County Health Practice
Field of Social Work

Loyola University (School of Medicine), Chicago, Ill

June 24–August 3

Methods and Materials in Health Education
Principles of Public Health Nursing
Public Health Statistics
Principles of Social Case Work
School Health Problems
Applied Public Health Nutrition
Public Health Nursing in Special Fields
Principles of Sociology
Educational Psychology
Organization and Administration in Public Health Nursing
Physiologic Hygiene
Community Hygiene and Epidemiology
Social and Public Health Aspects of Mental Hygiene
Public Health Law
Advanced Vital Statistics
Child Welfare

Massachusetts Institute of Technology, Cambridge, Mass.

Bacteriology (June 10–June 28)
Public Health Bacteriological Methods (July 1–July 19)
Food Technology (July 1–July 19)
Four Year Summer Program leading to C.P.H.
First Summer—July 1–August 21, 1940
Communicable Diseases
Principles of Sanitation
Public Health Administration
Vital Statistics

Michigan State College, East Lansing, Mich.

June 17–July 26

General Bacteriology
Medical Biology Courses
Pathological Bacteriology
Personal Hygiene
Industrial Hygiene
Physical Education Departments offer the following courses:
School Health Problems
First Aid

Mills College, Oakland, Calif.

June 11–August 3

Child Development
Dance in Education
Workshop in "Neuro-Psychiatry for Educators"
Intensive Program for Group-Work and Recreation Leaders

University of Minnesota, Minneapolis, Minn.

First Term, June 17–July 26

Second Term, July 29–August 30

First Term:
- Tuberculosis and Its Control
- Mental Hygiene
- Principles of Public Health Nursing
- Field Practice with Family Health Agency
- Supervision in Public Health Nursing
- Advanced Problems in Public Health Nursing
- Biometric Principles
- Biostatistics Laboratory
- Topics in Biostatistics

Second Term:
- Special Methods and Supervised Practice in Health Teaching
- Elements of Preventive Medicine and Public Health
- Maternal and Child Hygiene
- Field Work with Family Health Agency
- Environmental Sanitation—General
- Public Health Administration

National Society for the Prevention of Blindness, 50 West 50th Street, New York, N. Y. (in coöperation with the following colleges and universities)

Courses for the Training of Teachers and Supervisors of Sight-Saving Classes:

Oregon State System of Higher Education, Portland, Ore.
Elementary Course, June 17–July 26

State Teachers College, Buffalo, N. Y.
Elementary Course, July 1–August 9

University of Minnesota, Minneapolis, Minn.
Advanced Course, June 17–July 26

Wayne University, Detroit, Mich.
Elementary Course, June 24–August 2, or July 1–August 9

New Jersey State Teachers College, Montclair, N. J.

July 1–August 10

- Administration
- Biology
- General Science
- Guidance
- Personnel Problems
- Philosophy of Education
- Physical Education, Coaching
- Psychology and Mental Hygiene
- Research and Techniques
- Sociology
- Techniques of Education
- Tests and Measurements

University of New Mexico, Albuquerque, N. M.

June–August

- Social Hygiene
- Community Health
- Educational Hygiene

New York School of Social Work, New York, N. Y.

June 18–August 30

- Social Work Courses
- Community Health Problems
- Field Work

New York University, New York, N. Y.

Intersession: June 4–28

Summer Sessions: July 2–19 and July 22–August 9 at Washington Square; July 2–August 9 at Lake Sebago

Nursing Education: (at Washington Square)
- Principles and Methods of Teaching in Nursing Education
- Principles of Public Health Nursing I and II
- Organization of School Nursing
- Administration of Public Health
- Teaching of Home Nursing and Child Care I and II
- Home and Community Problems Caused by Tuberculosis
- Supervision in Public Health Nursing
- Observation and Practice in Public Health Nursing
- Communicable Diseases and the Nurse
- Administration of Clinic Services
- Survey of Eye Conditions
- Psychology of Childhood—Adolescence
- The Living Organism

Nursing Education: (at Lake Sebago)
- Survey of Physical Defects in Children
- Practicum in Rehabilitation of Orthopedic Defects
- Adaptation of Physical-Education Activities for the Atypical Individual

Northwestern University, Evanston and Chicago, Ill.

June 24–August 17

- Teaching Rhythms to Children
- Organization and Supervision of Health Programs

Advanced Kinesiology
Mental Hygiene in Teaching
Child Development
Sex Education in Social Work
Psychiatry for Social Workers

University of Pennsylvania, Philadelphia, Pa.

June 24–August 6

Nursing Education: Special Phases of Public Health Nursing
Physical Education: Principles of Health and Physical Education; Principles of Healthful Living

Rutgers University, New Brunswick, N. J.

July 1–August 9

Public Health Practice
Principles of Public Hygiene

Stanford University, Stanford University, Calif.

June 20–August 31

Physical Education and Hygiene

Smith College—School for Social Work, Northampton, Mass.

July 3–August 28

Medical Information

Springfield College, Springfield, Mass.

July 1–August 3

Materials and Methods in Health Education
Health and Physical Education for Atypical Children

Syracuse University, Syracuse, N. Y.

July 1–August 9

Principles of Public Health Nursing
Maternity and Child Hygiene
Special Fields in Public Health Nursing
Case Studies in Public Health Nursing
Preventable Diseases
Psychology (Child, Adolescent, Educational)
Nutrition
Hygiene Methods
Mental Hygiene

Temple University, Philadelphia, Pa. Teachers College — Department of Physical and Health Education

July–August

Personal and Community Hygiene
Supervision of Health Instruction
Orthopedics

University of Tennessee, Knoxville, Tenn.

June 10–July 17

Bacteriology
Child Development
Child Guidance
Education of Exceptional Children
Group Hygiene
Home Nursing
Human Physiology
Mental Hygiene (School)
Nutrition
Parasitology
Physical Education
Public Health Education
School Hygiene
Water Supply

July 18–August 23

Adolescent Psychology
Child Development
First Aid
Human Physiology
Nutrition
Personal Hygiene
Public Health Education
Water Supply

University of Utah, Salt Lake City, Utah

June 12–July 21

Biology
Chemical Research
Problems in Child Development
Guidance and Personnel in Secondary Schools
Physical Education and Hygiene
Home Economics
Social Work
Introduction to Public Health
Personal Health and Its Teaching
Principles of Child Welfare
The Child and the Curriculum
Activities in the Kindergarten
Social and Civic Functions of Education
Education in C.C.C.
Driver Education and Traffic Safety
Nutrition for Teachers
Advanced Course in Nutrition (Grad.)
American Social Problems
Principles of Social Psychology
Lipreading

Vassar College, Poughkeepsie, N. Y.

June 20–July 31

Institute of Euthenics:
- Special Work in Guidance and Science (for secondary school teachers)
- Child Development
- Home Management

University of Virginia, University, Va.

June 17–July 27

Hygiene and Sanitation

Wagner College, Staten Island, N. Y.

June 10–July 20

Bacteriology
Applied Bacteriology
Serology
Clinical Pathology
Seminar in Medical Technology

Washington University, St. Louis, Mo.

June 17–July 26

Education
Natural Sciences
Psychology
Sociology and Social Work

University of Washington, Seattle, Wash.

June 17–July 17 (First Term)
July 18–August 16 (Second Term)

Diagnostic and Remedial Work in Education
Behavior as an Expression of Health
Nutrition for Public Health Nurses
Readings in Nutrition
Bacteriology
Organization, Administration, and Techniques in Special Fields of Public Health Nursing
Public Health Administration and Epidemiology
Principles of Teaching Nursing and Health
Methods of Supervision of Public Health Nursing
Methods and Materials in Health Teaching
School Health Program
Public Health Program

Wayne University, Detroit, Mich.

June 26–August 16

Measuring in Health Education
Materials and Methods of Safety Education
Problems of School Health
Problems in Summer Camp Work for Handicapped Children
Principles of Summer Camp Leadership
Individual Hygiene
Physiological Hygiene

University of West Virginia, Morgantown, W. Va.

June 12–August 26

First Term:
- Problems in Health and Physical Education
- Tests in Health and Physical Education
- Advanced Public School Health
- Seminar in Health and Physical Education

Second Term:
- Problems in Health and Physical Education
- Tests in Health and Physical Education
- Seminar in Health and Physical Education

Western Reserve University—School of Nursing, Cleveland, Ohio

June 17–July 26

Public Health Nursing
Principles and Practices of Public Health Nursing
Principles of Orthopsychiatry

University of Wisconsin, Madison, Wis.

June 24–August 2

Curriculum in Physical Education for Junior and Senior High School Girls
First Aid and Safety Education
Health Education in Schools
Human Anatomy
Medical Bacteriology
Physical Examinations and Therapeutics
Play, Recreation and Leisure Time Problems
Physical Therapy
School Health and Hygiene
Therapeutic Gymnastics
Organization and Administration of a City Recreation Program
The Extra-curricular Physical Education Program in the Public Schools
Physical Education for Elementary and Secondary Schools
Recent Advances in Applied Physiology

ANNUAL MEETING OF PUBLIC HEALTH ASSOCIATION OF NEW YORK CITY

THE Fourth Annual Meeting of the Public Health Association of New York City took place on April 9, at the George Washington Hotel, New York.

Two well attended afternoon sessions were held, which were devoted to a discussion of engineering and health education. The dinner meeting was attended by 200 public health workers, and the speaker was Dr. Jay B. Nash, Professor of Education at New York University.

The following new officers were elected for the current year:

President—Arthur I. Blau, M.D.
1st Vice-President—Helen C. Manzer, Ph.D.
2nd Vice-President—Frank A. Calderone, M.D.
Secretary-Treasurer—Frank Kiernan
Representative on A.P.H.A. Governing Council—Hazel Corbin

NEW ENGLAND HEALTH EDUCATION INSTITUTE

THE New England Health Education Institute held its tenth session in Hartford, Conn., April 15–19. Among the sponsors were the six State Departments of Health of New England, the U. S. Public Health Service, the U. S. Children's Bureau, the New England Tuberculosis Association, and the departments teaching public health at Yale, Harvard, the Massachusetts Institute of Technology, and Simmons College. Also joining this year were the Connecticut State Medical Society, the State Nurses Association, and the Connecticut Public Health Association.

This was the tenth New England Health Institute. Begun in 1922 in Connecticut, it was then held in rotation in Massachusetts, Maine, New Hampshire, Rhode Island, and Vermont, the last meeting being held in Maine in 1931.

During the five days of the Institute, more than 500 persons registered and attended sessions organized under the 16 sections covering many different aspects of the public health field. The faculty included 120 persons, among whom the Section Chairmen were: John A. Ferrell, M.D., Wilson G. Smillie, M.D., Roscoe H. Suttie, C.E., Halbert L. Dunn, M.D., Eliott S. Robinson, M.D., R. A. Vonderlehr, M.D., R. R. Sayers, M.D., C. L. Larkin, M.D., Hugh B. Campbell, M.D., Martha M. Eliot, M.D., R. C. Hood, M.D., George R. Cowgill, Ph.D., Mary D. Forbes, R.N., Eugene Kahn, M.D., Clair E. Turner, Dr.P.H., and E. G. Woodward.

NEW YORK STATE MARRIAGES AND THE SYPHILIS LAW

IT has been announced by J. V. DePorte, Ph.D., Director of the Division of Vital Statistics of the New York State Department of Health, that in New York State exclusive of New York City more residents were married in 1939 than during the previous year, despite the stringent marriage laws and the requirement of the test for syphilis which became effective July 1, 1938.

A notable effect was the reduction of non-residents married in New York State who in 1939 totaled only 1,711 as compared with a peak of 23,521 in 1936. It is stated that the requirement for a syphilis examination impelled many New York couples to be married in other states during the first few months of the application of the law, but there is evidence that this movement has practically ceased.

TULAREMIA AND COTTONTAILS

PREVALENCE of tularemia or rabbit fever in Western states brought the second successive New York State ban on the importation of cottontail rabbits recently. The Conservation Department reports the disease at least as widespread as it was a year ago when foreign rabbits were first barred.

EIGHTH AMERICAN SCIENTIFIC CONGRESS

INVITATIONS have been extended to the governments of all American republics to participate in the 8th American Scientific Congress, to be held in Washington, May 10–18. The occasion will mark the foundation of the Pan American Union in 1890. Previous Scientific Congresses have been held beginning in 1898 at Buenos Aires, Montevideo 1901, Rio de Janeiro 1905, Santiago de Chile 1908, Washington 1915–1916, Lima 1924–1925, and Mexico City 1935.

Among the 8 sections which cover both theoretical and applied sciences, history, economics, and education, is Section V dealing with public health and medicine. Dr. Thomas Parran, Surgeon General of the U. S. Public Health Service, Washington, is the Chairman.

The announcement points out that the program for this Section has been prepared to include particular subjects of interest to all of the American republics, especially those fields in which significant progress has been made in recent years.

Among the subjects to be discussed under Section V are (1) nutrition, with special reference to pellagra and the application of available methods for determining the prevalence of nutritional defects; (2) tuberculosis, with special reference to the determination of its prevalence, including the use of tuberculin and the x-ray, and the advances in surgery in tuberculosis of the chest; (3) cancer, with special reference to etiological factors, organization of services which will make available the latest knowledge, the best practices in diagnosis and treatment, and the comparative usefulness of different sources of radiant energy; (4) chemotherapy, with special reference to the newer synthetic drugs in the treatment of gonorrhea, puerperal sepsis, venereal lymphogranuloma, and pneumonia; (5) diseases of the heart, with emphasis on acute rheumatic fever and syphilitic heart disease; (6) rehabilitation of physically handicapped children; (7) tropical and other diseases, with special reference to undulant fever, endemic typhus, tularemia, pneumonic plague, verruga, onchocerciasis, dysentery, pinto, and yellow fever.

Among those invited to attend are the official and institutional delegates from countries members of the Pan American Union and other members, including members of the various coöperating committees as appointed by the respective governments, honorary designates upon special invitation by the organizing committee, authors of papers, and individual participants.

STUDIES IN INFANTILE PARALYSIS

A DONATION of $13,800 from the National Foundation for Infantile Paralysis, Inc., has been made to the University of California to investigate the exact relationship between human infantile paralysis and equine encephalomyelitis. This will be undertaken at the Hooper Foundation for Medical Research on the San Francisco campus of the University.

NEW REPORT ON CASE FINDING PROCEDURES IN TUBERCULOSIS

THE Committee on Evaluation of Administrative Practices, one of the sub-groups of the Committee on Administrative Practice, has presented a report on Case Finding Procedures in Tuberculosis. This is the result of 2 years of study by a special group of clinicians and administrative leaders in tuberculosis control, and is presented as a provisional report in which the problem of case finding is analyzed, and conclusions and recommendations as to the relative merits of different procedures under specific circumstances are discussed.

The report is published by the National Tuberculosis Association and is distributed through affiliated state and local tuberculosis associations or through the Book Service of the American Public Health Association at 25 cents for single copies.

The Committee on Evaluation of Administrative Practices, of which Dr. Haven Emerson is Chairman, believes that this material is of value to health officers and those concerned with tuberculosis control, and has authorized the publication of this preliminary report as a manual on case finding, hoping to secure a still wider consideration of the problem. The committee welcomes criticisms and suggestions regarding the items dealt with in the manual.

Dr. Emerson points out that, in view of the considerable reduction in the general prevalence of tuberculosis during the last few decades, it is necessary to use new and varied case finding methods appropriate to the earliest practicable discovery of the disease. This is essential if we are to be successful in what may prove to be the ultimate "mopping up" process by which we shall relegate human as we have bovine tuberculosis to the category of diseases of only occasional and diminishing occurrence. Much effort and large sums of money have been spent upon various plans of tuberculosis case finding in recent years. Increased attention has been given to the systematic sampling of population groups to determine the incidence of clinically significant tuberculosis and of tuberculous infection. Because of the lack of standardization or comparability of procedures, materials, and diagnostic criteria, however, few basic conclusions of general application could be drawn from these experiences, and a critical study of tuberculosis case finding procedures seemed essential as an aid to public health administrators.

SOUTHERN CALIFORNIA PUBLIC HEALTH ASSOCIATION ELECTS OFFICERS

AT the annual meeting of the Southern California Public Health Association, held recently, the following officers were elected:

President—C. Morley Sellery, M.D.
President-Elect—Hyman I. Vener, M.D.
First Vice-President—Theodore D. Beckwith, Ph.D.
Second Vice-President—Roy O. Gilbert, M.D.
Secretary-Treasurer—Eunice Lamona, R.N.
Assistant Secretary-Treasurer—Floyd P. Wilcox, D.V.M.

CONNECTICUT PUBLIC HEALTH ASSOCIATION ELECTS NEW OFFICERS

AT the 1940 Annual Meeting of the Connecticut Public Health Association, held in Hartford on April 17, the following new officers were elected:

President—W. Bradford Walker, M.D., Cornwall
President-Elect—Richard O'B. Shea, M.D., Bridgeport
Vice-President—Paul H. Brown, M.D., Stamford
Secretary-Treasurer—Mario L. Palmieri, M.D., Middletown

RADIOACTIVE STANDARDS

THE National Research Council has announced that a series of radioactive standards is being prepared under the direction of its committee on this subject. The standards will be deposited in the National Bureau of Standards in Washington to be issued as working standards to investigators who desire them. At present the preparations are as follows: Radium Standards, Thorium Standards, and Standard Rock Samples. It is expected that these standards will provide all workers in this field with a common basis for comparison of measurements and will improve the accuracy of measurements of this type.

Communications may be addressed to the Chairman of the Committee, Pro-

fessor Robley D. Evans, Department of Physics, Massachusetts Institute of Technology, Cambridge.

NOMINATIONS FOR HALL OF FAME

NEW YORK University has announced that 143 men and women have been chosen so far as candidates for the 9th quinquennial election to the Hall of Fame for Great Americans on the campus of New York University. The names of these 143 historical figures, all of whom have been dead at least 25 years, now go to the Senate of New York University for seconding. Final election is by the 114 members of the College of Electors.

Among the names of those having relationships with medicine and public health in the nominations are the following:

Dr. William Beaumont (1785–1853), physician who first observed the process of digestion

Johns Hopkins (1795–1873), founder of Johns Hopkins University

Dr. Jesse W. Lazear (1866–1900), who participated in the fight against yellow fever.

Dr. Ephraim McDowell (1771–1830), surgeon who performed the first ovariotomy

Dr. Silas Weir Mitchell (1829–1914), pioneer in the application of psychology to medicine

Horace Wells (1815–1848), first used nitrous oxide gas as an anesthetic in dentistry.

STANDARD HIGHWAY SAFETY PROGRAM FOR STATES

THE Automotive Safety Foundation, of New York, N. Y., has announced a Standard Highway Safety Program for States which purports to be a working program to increase traffic efficiency and to reduce accidents.

The report covers legislation, motor vehicle administration, enforcement, engineering, education, training personnel, and research.

Copies may be obtained on application from the Foundation.

TUBERCULOSIS CONGRESS TO BE HELD IN ARGENTINA

THE Fifth Pan American Congress of Tuberculosis will be held in Buenos Aires and Cordoba, Argentina, October 13–17, under the presidency of Dr. Gumersindo Sayago, of Cordoba.

ARGENTINA'S SURGEON GENERAL VISITING THE UNITED STATES

DR. Miguel Susini, Director del Departmento Nacional de Higiene of Argentina, is visiting the United States. After conferences with Surgeon General Thomas Parran in Washington, he will visit outstanding hospitals and medical schools.

PUERTO RICO HOME FOR CHILDREN OPENED

THE Department of Health of Puerto Rico inaugurated its Rafael Martinez Nadal Insular Home for Children at Guaynabo, March 3.

The new school, which accommodates about 400 children, has modern vocational education facilities.

NEW DOCUMENTARY FILMS

THE film "Choose to Live," produced by the U. S. Public Health Service and the American Society for the Control of Cancer to aid in the campaign against cancer, was previewed in Washington recently. Designed for lay audiences, the picture tells the story of one woman's encounter with cancer and presents educational information on the subject. The actors are professional, and the hospital and laboratory scenes were taken at Memorial Hospital, New York, Marine Hospital, Baltimore, and the National Cancer Institute, Bethesda, Md., to assure medical accuracy.

The initial showings of Pare Lorentz's "The Fight for Life," a maternity film, produced by the United States Film Service, brought both acclaim and criticism to the director and the pro-

ducers. There is apparently favorable agreement concerning technic, photography, and the fact that it teaches the lesson for which it was planned—there are too many unnecessary deaths in childbirth. Scientists, however, appear to be divided in their prognostications of the effect of the film upon prospective mothers. The Maternity Center Association has been vocal in deploring its depressing characteristics and its probable inculcation of fear.

MISSOURI ESTABLISHES NEW HEALTH UNITS

FULL-time health units were recently established in Jasper and Pemiscot Counties, bringing to a total of 8 the number of counties with units subsidized in part by funds from the Missouri State Board of Health. Webb City is headquarters for the Jasper County unit, and Caruthersville for Pemiscot County.

HARBEN GOLD MEDAL

THE Harben Gold Medal of the Royal Institute of Public Health and Hygiene, London, has been awarded to Sir Leonard Hill, Professor of Physiology at the Hospital of the University of London. The Smith award has also been conferred on Sir William Savage, recently Medical Officer of Health, Somerset.

SEDGWICK MEMORIAL LECTURE

THE Sedgwick Memorial Lecture, combined with the Delta Omega Lecture for Gamma chapter, was given this year by Dr. Thomas Parran, Surgeon General of the U. S. Public Health Service, on April 11, at the Massachusetts Institute of Technology, Cambridge, Mass.

CHARLES R. COX RECEIVES THE FULLER AWARD

IT has been announced by New York State *Health News* that Charles R. Cox, Chief of the Bureau of Water Supply, New York State Department of Health, has been chosen by the Committee of the American Water Works Association to receive the 1939 national award to the New York section in recognition of his services in the sanitation of water supplies. The certificate was presented during the general convention of the Association held in Kansas City in April.

PERSONALS

Central States

BENEDICT B. BACKLEY, M.D., of Jacksonville, Ohio, has been named Health Commissioner of the new combined Athens City and County Health Unit.

DR. CHARLES J. HEDLUND, formerly of Atwater, Minn., has been appointed Health Officer of a new health unit in Baker County, Ore.

DAVID D. HOLADAY, M.D., formerly of Osage City, has been appointed full-time Health Officer of Marion County, Kans.

R. G. MOSSMAN, M.D., has been appointed Commissioner of Health of Youngstown, Ohio.

DR. FRANCIS R. NEFF, of London, has been named Health Commissioner of Madison County, Ohio, succeeding the late DR. R. S. TRIMBLE.

DR. RICHARD F. RICHIE, formerly of Lincoln, Neb., has been appointed Assistant Director of the division in charge of the children's unit of the Mental Hygiene Division of the North Carolina State Board of Charities and Public Welfare.

JOSEPH W. SPEARING, M.D.,† formerly of Cimarron, Kans., has been appointed Health Officer of Cherokee County, with offices in Columbus.

DR. WILLIAM L. STRUNK, head of the Student Health Service at St. Olaf College, Northfield, Minn., has been

* Fellow A.P.H.A.
† Member A.P.H.A.

appointed Conservation Commissioner for the State of Minnesota, with leave of absence from St. Olaf College.

Eastern States

FRANKLYN B. AMOS, M.D.,† District Health Officer in charge of the Amsterdam District Office of the New York State Department of Health, has been made Assistant Director, Local Health Administration, with headquarters in Albany.

BERNARD M. BLUM, M.D., M.P.H.,* Assistant District Health Officer of the New York State Department of Health, on the staff of the Buffalo District Office, has been transferred to the position of Epidemiologist on the staff of the Division of Communicable Diseases, with headquarters in Albany.

HELENE BUKER, M.A., R.N.,† formerly Director of Nurses in the Cattaraugus County Department of Health, Olean, N. Y., has been appointed Assistant Director of the Bureau of Public Health Nursing, Michigan Department of Health.

JOHN W. M. BUNKER, PH.D.,* Professor of Biochemistry and Physiology and Director of the Research Laboratories of Biology at the Massachusetts Institute of Technology, has been appointed Dean of the Graduate School.

REEVE B. HOWLAND, M.D.,† has recently resigned from his position as Health Officer of Elmira, N. Y.

ROBERT C. HUME, M.D., M.P.H.,† who has been on the staff of the Cattaraugus County Health Department, Olean, N. Y., has been appointed an Assistant District State Health Officer of the New York State Department of Health.

W. L. J. MCDONALD, M.D.,† formerly Assistant District Health Officer of the New York State Department of Health, at the Glens Falls office, has been appointed Commissioner of Health of the Columbia County Department of Health, Hudson, N. Y. Dr. McDonald succeeds LOUIS A. VAN HOESEN, M.D.,† who retired January 1, 1940.

HARRY S. MUSTARD, M.D.,* Professor of Preventive Medicine at the New York University College of Medicine, has been appointed Director of the DeLamar Institute of Public Health, Columbia University, New York, N. Y. Dr. Mustard will also succeed DR. HAVEN EMERSON * as Professor of Public Health Practice. Dr. Emerson will retire July 1, after 19 years as a member of the Columbia faculty.

ERNEST L. STEBBINS, M.D., C.P.H.,* Albany, N. Y., Assistant Commissioner for Preventable Diseases of the New York State Department of Health, has been named Professor of Epidemiology at the DeLamar Institute of Public Health, Columbia University, New York, N. Y.

EDMUND C. VAN DUSEN, M.D., Health Officer of Athens, N. Y., has resigned.

DR. JAMES WATSON, recently a member of the staff of the Worcester State Hospital, Worcester, Mass., has been appointed Director of the Mental Hygiene Division of the North Carolina State Board of Charities and Public Welfare.

CHARLES F. WILINSKY, M.D.,* Director of Beth Israel Hospital, Boston, Mass., and Deputy Commissioner of Health in the Boston Department of Health, has been elected President of the New England Hospital Association for the coming year.

Southern States

DR. CLAYTON A. ADAMS, JR., formerly of Trenton, has been appointed

* Fellow A.P.H.A.
† Member A.P.H.A.

Health Director of Jackson County, with headquarters in Marianna, Fla.

GEORGE M. ANDERSON, M.D.,† of Eastman, Ga., has resigned as Commissioner of Health of Dodge County.

JOHN M. DAVID,† formerly Public Health Engineer, Bulloch County, Statesboro, Ga., has accepted appointment as Regional Public Health Engineer, Georgia Department of Public Health, at Swainsboro, Ga.

DR. ABRAM J. DAVIS, of Waynesboro, Ga., formerly Commissioner of Health of Burke County, has been appointed Regional Medical Director of the East Central Health Region of the State of Georgia. He will be succeeded by DR. WILBUR D. LUNDQUIST, formerly of Lodi, Calif.

JOHN W. FERTIG, PH.D., Associate in Biostatistics in the School of Hygiene and Public Health of Johns Hopkins University, Baltimore, Md., has been named Professor of Biostatistics at the DeLamar Institute of Public Health, Columbia University, New York, N. Y.

DR. HENRY C. FRECH, JR., of Savannah, Ga., has been appointed Assistant Director of Maternal Hygiene at the Chatham-Savannah Health Department.

OSCAR DAVID GARVIN, M.D.,† of Lancaster, S. C., recently Health Officer of Lancaster County, has been appointed Health Officer of Spartanburg County, to succeed DR. HILLA SHERIFF.†

DR. OSCAR EMERSON HAM, of Atlanta, Ga., has been appointed Commissioner of Health of Bartow County.

DR. RUSKIN KING, of Savannah, Ga., has been appointed Assistant Director of Infant Hygiene at the Chatham-Savannah Health Department.

DR. ROBERT J. LAMB, formerly of Jacksonville, has been appointed Health Officer of Franklin and Gulf Counties, succeeding DR. DERRIC C. PARMENTER. His headquarters will be in Apalachicola, Fla.

DR. JOHN F. SIMMONS, of Greenville, S. C., has been appointed Health Officer of Georgetown County.

DR. CHARLES R. SMITH, of Morgan, Ga., has been appointed Commissioner of Health in Calhoun County.

JAMES A. THRASH, M.D.,† of Columbus, Ga., has been appointed in charge of a combined city-county Health Department established in Columbus, and Muscogee County.

Western States

ERNEST L. BERRY, M.D.,† of Buhl, Ida., has been appointed Idaho State Director of Health. He succeeds DR. HOWARD L. MCMARTIN, of Boise, who has been Acting Director.

DR. WILBUR D. LUNDQUIST, formerly of Lodi, Calif., who recently completed a course of training in public health administration, has been appointed by the Georgia State Department of Public Health as Commissioner of Health of Burke County to succeed DR. ABRAM J. DAVIS, of Waynesboro.

DEATHS

F. E. AYERS, M.D., for 21 years Commissioner of Health of Mercer County, Ohio, died February 23, at the age of 63.

PLATT WALKER COVINGTON, M.D., M.P.H.,* of Salt Lake City, Utah, director in the western states of the work of the International Health Division, Rockefeller Foundation, and former President of the Western Branch of the American Public Health Association, died in Baltimore, Md., April 20, after an illness of several months, at the age of 55.

* Fellow A.P.H.A.
† Member A.P.H.A.

CONFERENCES AND DATES

American Association for Adult Education—15th Annual Meeting. Hotel Astor, New York, N. Y. May 20–23.

American Association of Industrial Physicians and Surgeons—25th Annual Meeting. With First Annual Meeting of American Industrial Hygiene Association. Hotel Pennsylvania, New York, N. Y. June 4–7.

American Association of Public Health Dentists. Cleveland, Ohio. September 8–9.

American Association of Social Workers (Delegate Conference). Grand Rapids, Mich. May 24–25.

American Association of the History of Medicine. Atlantic City, N. J. May 4–5.

American Dental Association. Cleveland, Ohio. September 9–13.

American Dietetic Association — 23rd Annual Meeting. Pennsylvania Hotel, New York, N. Y. October 21–24.

American Heart Association. Scientific Meeting. Hotel Roosevelt, New York, N. Y. June 7–8.

American Home Economics Association —33rd Annual Meeting. Cleveland, Ohio. June 23–27.

American Hospital Association. Boston, Mass. September 16–20.

American Library Association. Cincinnati, Ohio. May 26–June 1.

American Medical Association — 91st Annual Meeting. Waldorf-Astoria Hotel, New York, N. Y. June 10–14.

American Nurses' Association. National Biennial Nursing Convention. Bellevue-Stratford Hotel, Philadelphia, Pa. May 11–18.

American Pediatric Society. Skytop, Pa. May 2–4.

American Public Health Association —69th Annual Meeting. Book-Cadillac Hotel, Statler Hotel, Detroit, Mich. October 8–11.

American Scientific Congress—8th. In connection with celebration of 50th Anniversary of founding of the Pan American Union. (First Section meeting, May 13.) Washington, D. C. May 10–18.

American Society of Civil Engineers. Summer Meeting. Denver, Colo. July 24–26.

American Society of Planning Officials. National Conference on Planning, in coöperation with American Institute of Planners, American Planning and Civic Association, and National Economic and Social Planning Association. San Francisco, Calif. July 8–11.

American Water Works Association—

Ohio Section — Mayflower Hotel, Akron, Ohio. May 9–10.

Pacific Northwest Section—Portland Hotel, Portland, Ore. May 9–11.

Florida Section — Seminole Hotel, Jacksonville, Fla. May 16–18.

Illinois Section—Congress Hotel, Chicago, Ill. May 22–24.

New York Section — Ithaca Hotel, Ithaca, N. Y. June 6–7.

Michigan Section — University of Michigan Union, Ann Arbor, Mich. September 11–13.

Rocky Mountain Section—Denver, Colo. September 16–17.

Western Pennsylvania Section — Castleton Hotel, New Castle, Pa. September 18–20.

Southwest Section — Mayo Hotel, Tulsa, Okla. October 14–17.

New Jersey Section—Atlantic City, N. J. October 18–19.

Kentucky-Tennessee Section — Lafayette Hotel, Lexington, Ky. October 21–23.

California Section—Los Angeles Biltmore Hotel, Los Angeles, Calif. October 23–26.

Minnesota Section—St. Paul Hotel, St. Paul, Minn. November 7–8.

Association of American Medical Colleges. Ann Arbor, Mich. October 28–30.

Association of American Physicians. Atlantic City, N. J. May 7–8.

Building Officials Conference of America. St. Louis, Mo. June 3–6.

Canadian Public Health Association—29th Annual Meeting. Winnipeg, Man. September 23–28.

Central Atlantic States Association of Dairy, Food and Drug Officials—Annual Conference. Hotel Raleigh, Washington, D. C. May 16–17.

Citizens' Conference on Government Management. University of Denver. Estes Park, Colo. June 17–22.

Civil Service Assembly. Central Regional Conference, Chicago, Ill., May 15–17. Western Regional Conference, Portland, Ore., June 24–26. Eastern Regional Conference, June.

Conference of State and Provincial Health Authorities of North America. Washington, D. C., May 7–8. (May 11, at National Institute of Health.)

Conference on Health and Physical Education. University of Denver, Denver, Colo. June 24–26.

Convention for the Revision of the Pharmacopoeia of the United States. Washington, D. C. May 14.

Dairy Industries Supply Association. Atlantic City, N. J. October 21–26.

Florida Public Health Association. Tampa, Fla. December.

Health Officers and Public Health Nurses—Annual Conference. Under the Auspices of the New York State Department of Health. Saratoga Springs, N. Y. June 24–27.

Indiana State Medical Association. French Lick Springs Hotel, French Lick, Ind. October 29–31.

Institute of Food Technologists—First Meeting. Morrison Hotel, Chicago, Ill. June 17–19.

Institute of Government. University of Southern California, Los Angeles, Calif. June 10–14.

Institute on Maternal and Infant Hygiene—for registered nurses. University of California, Berkeley, Calif. July 1–20.

International Association of Milk Sanitarians. Joint Meeting with the New York State Association of Dairy and Milk Inspectors. Hotel Pennsylvania, New York, N. Y. October 17–19.

International Association of Public Employment Services. Kansas City, Mo. May 14–17.

International Congress on Rheumatism—7th. New York, Boston, and Philadelphia. June 1–10.

Interstate Post-Graduate Medical Assembly. Cleveland, Ohio. October 13–19.

Maryland State Department of Health—20th Annual Health Conference, for field and departmental staffs. Baltimore, Md. May 3.

Medical Library Association — 42nd Annual Meeting. University of Oregon Medical School, Portland, Ore. June 25–27.

Medical Society of the State of New York. New York, N. Y. May 6–8.

Michigan Public Health Association. Detroit, Mich. October 8–11.

Missouri Public Health Association—Annual Meeting. Jefferson City, Mo. May 23–25.

Mother's Day. May 12. Tenth annual nation-wide campaign to make maternity safe—Maternity Center Association, New York.

National Association of Coroners. Hotel Adelphia, Philadelphia, Pa. August 26–28.

National Association of Housing Officials. William Penn Hotel, Pittsburgh, Pa. May 13–14.

National Association of Purchasing Agents—Governmental Group. Cincinnati, Ohio. June 3–6.

National Biennial Nursing Convention. Bellevue-Stratford Hotel, Philadelphia, Pa. May 11–18.

National Conference of Social Work. Grand Rapids, Mich. May 26–June 1.

National Conference on State Parks. Starved Rock, Ill., to Spring Mill, Ind. May 13–15.

National Council of State Public Assistance and Welfare Directors. Chicago, Ill. May 24–25.

National Education Association. Milwaukee, Wis. June 30–July 4.

National Fire Protection Association. Atlantic City, N. J. May 8–11.

National League of Nursing Education. National Biennial Nursing Convention. Bellevue-Stratford Hotel, Philadelphia, Pa. May 11–18.

National Organization for Public Health Nursing. National Biennial Nursing Convention. Bellevue-Stratford Hotel, Philadelphia, Pa. May 11–18.

National Posture Week. May 6–11.

National Restaurant Association. Chicago, Ill. October 7–11.

National Safety Council. Chicago, Ill. October 7–11.

National Tuberculosis Association. Hotel Statler, Cleveland, Ohio. June 3–6.

New Mexico Public Health Association. Albuquerque, N. M. May.

New York State Association of Public Health Laboratories — 24th Annual Meeting. School of Medicine and Dentistry, University of Rochester, Rochester, N. Y. May 20.

New York State Conference of Mayors and Other Municipal Officials. Rochester, N. Y. June 10–12.

North Carolina Public Health Association. Pinehurst, N. C. May 13.

Ohio Federation of Public Health Officials. Columbus, Ohio. May 24.

Pan American Sanitary Conference—Joint Session with Conference of State and Provincial Health Authorities of North America. Washington, D. C. May 8.

Pennsylvania Public Health Association. Philadelphia, Pa. May 23.

Schoolmen's Conference—on "Facing Youth Problems." New Jersey State Teachers College, Montclair, N. J. July 11–12.

Smoke Prevention Association — 34th Annual Convention. Hotel Statler, St. Louis, Mo. May 21–24.

Society of American Bacteriologists. St. Louis, Mo. December.

South Carolina Public Health Association. Myrtle Beach, S. C. May 27–30.

Special Libraries Association. Claypool Hotel, Indianapolis, Ind. June 3–6.

State and Provincial Health Authorities of North America. Washington, D. C., May 7–8. (May 11, at National Institute of Health.)

Symposium on Clinical Experience in Nursing. Catholic University of America, Washington, D. C. June 26–27.

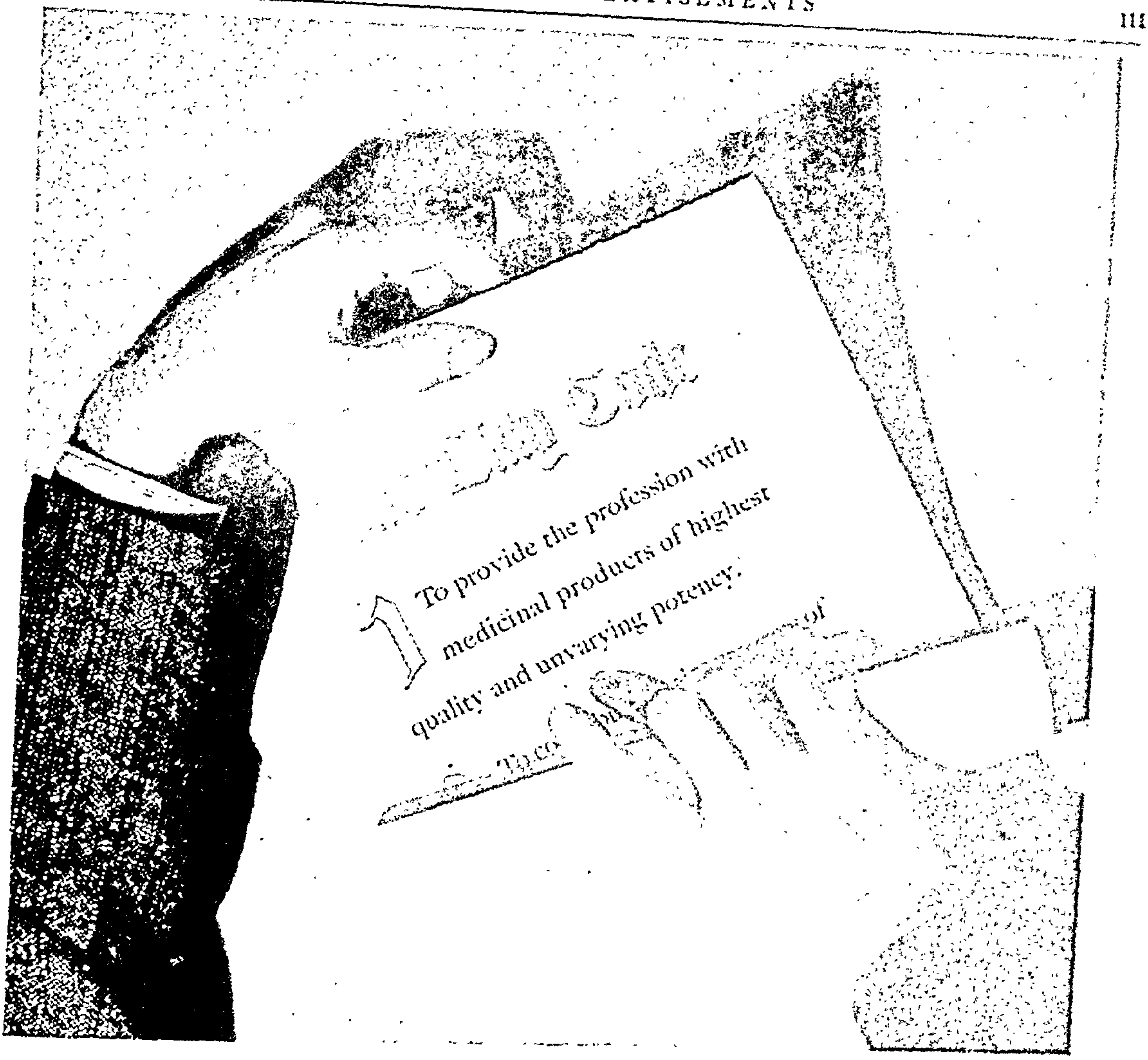
Texas Public Health Association. Fort Worth, Tex. September 30–October 2.

Tri-State Conference of Food and Health Officials. Pittsburgh, Pa. October.

Western Branch, American Public Health Association — 11th Annual Meeting. Denver, Colo. June 24–27.

CORRECTION

WE regret a typographical error in The National Drug Company's advertisement in the March issue. The word "Petronal" was unfortunately substituted for "National." The corrected advertisement is being run on page XIII of this issue.



Orally Administered Bismuth in the Treatment of Syphilis

Pulvules Sobisminol Mass, Lilly* in a dose of two or three pulvules three times daily, rapidly produce a high urinary bismuth excretion and exert a powerful antisyphilitic effect. To guard against inadequate treatment through irregularity of administration, Sobisminol Mass may best be regarded as an adjunct to parenteral therapy.

A convenient test kit for determination of urinary excretion of bismuth is available.

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American Journal of Public Health
and THE NATION'S HEALTH

Official Monthly Publication of the American Public Health Association

Volume 30 June, 1940 Number 6

CONTENTS

Continued on page vi

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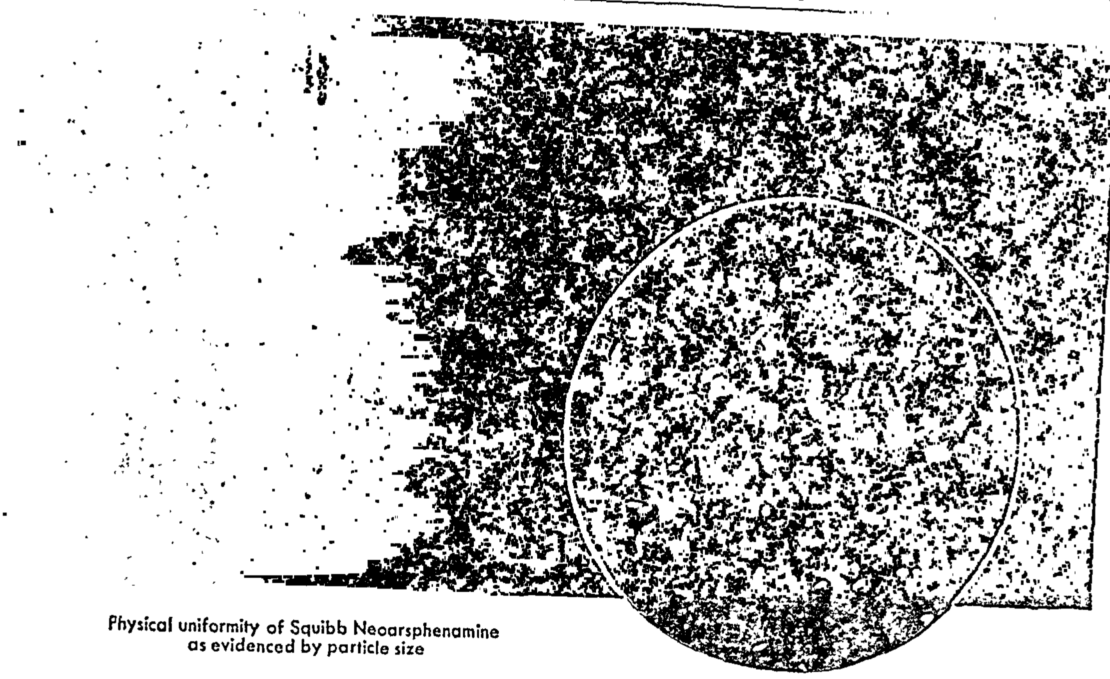

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Contents—Continued

INDEX TO ADVERTISERS

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Some Obscure Factors in the Epidemiology of Malaria*

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IN the well known Museum of Hygiene at Dresden, the entrance to the division of communicable diseases is through an antechamber dedicated to an exhibit summarizing what we know about malaria. This selection of a type disease to serve as a general introduction to the whole field of epidemiology is significant. It signifies the fundamental unity of that diversified subject which makes it possible, by illustrating in great detail the sources and modes of one infection, to provide the visitor with a key which will facilitate his approach to all the others. It is with this idea that I venture into a rather special field to bring to your attention a few of the more obscure factors in the malaria problem as we see it today.

These factors are not entirely novel, but they have not succeeded in obtaining recognition in the ordinary malaria survey as it is described in the textbooks and carried out in practice. Nevertheless they may all, under certain circumstances, profoundly influence the malaria picture in a single locality or over great regions, and a proper evaluation of them will certainly throw light on some of the extraordinary anomalies and surprises which so often confront the epidemiologist when he begins to analyze malaria phenomena. Their effects however are not easy to measure or interpret, and it is likely that we may have to supplement or replace the old style survey by new technics and the sort of connected study in laboratory and field now being developed by a small but expanding group of specialists often labeled "malariologists" in a rather discriminatory way, but who are of course only epidemiologists engaged in the study of malaria.

Now the first step in the dissemination of malaria takes place when a susceptible mosquito bites a malaria carrier, and we may logically assume that the frequency with which this happens determines in large measure the scale on which the infection is being transmitted in the community. The primary objects of a survey therefore are to determine the identity and prevalence of the insect vector, and to esti-

* Read before the Epidemiology Section of the American Public Health Association at the Sixty-eighth Annual Meeting in Pittsburgh, Pa., October 17, 1939.

mate the number of malaria carriers in the locality. There are three other steps in the complete cycle of transmission, it is true. The sexual multiplication of the parasite must take place in the body of the mosquito; the infected mosquito then bites a healthy person, and the healthy person is eventually converted into a malaria carrier. But the first step is the quantitative one and the others follow in due course. The rate of malaria transmission depends essentially on the density of the vector mosquito and the frequency of carriers in the population.

These factors have been defined and restricted by our growing knowledge. The only susceptible mosquitoes are anophelines, and of the 200-odd species of anophelines not more than 15 have been incriminated as habitual distributors of malaria parasites; furthermore these 15 are scattered all over the world, so that there are usually only one or two dangerous species in any one area. Similarly, as regards the parasite, it has long been known that infected persons do not have sexual forms of the plasmodium in the circulating blood all the time and hence are true carriers only intermittently or for a limited period. Merely counting the positive bloods, as is ordinarily done in a survey, gives a very inaccurate approximation of the proportion of carriers in the population.

However, the number of carriers is after all not a quantitative factor in malaria prevalence, in the sense that it is an independent variable. At least one carrier must be present to start the process, or there will be no malaria; but once started, it is the anophelines which maintain the supply of carriers and increase their numbers until a certain balance is struck. The presence of carriers is therefore a qualitative and not a quantitative factor, and their number goes up and down with the number of mosquitoes. Of course, it sometimes happens in connection with migrations of peoples, movements of troops, or importations of labor, that the number of carriers assumes importance as an independent quantitative factor, but not for the ordinary endemic status of a fairly stable community. In the light of analysis, then, the mosquito factor is seen to play a governing rôle, and it is the density of efficient anopheline vectors which should determine to a great extent the degree of malaria transmission in a locality.

Nevertheless, we are constantly being confronted with situations in which this does not seem to hold true. Nothing has been more confusing to epidemiologists than to find in an astonishing number of localities, and in fact over great regions of the earth, that there is little or no correlation between the numbers of well attested anopheline vectors and the amount of malaria. I am not referring now to mistakes of identity between harmless and dangerous varieties of the same species. I mean that the same mosquito will often be an effective vector in one area and not in another, and that among the known vectors, there are varying degrees of efficiency so that some are exceedingly dangerous and some are only moderately so. If they could be graded according to this character, *Anopheles gambiae* which has conquered Africa and is now terrorizing Brazil would probably head the list, and the fresh water varieties of the European *Anopheles maculipennis* might bring up the rear. There are clearly powerful influences at work, of which we take little account in our surveys, favoring or embarrassing transmission, modifying its consequences and upsetting calculations based on the more apparent and more measurable factors.

It occurs to us at once that some anophelines may be less susceptible to malaria infection than others. A great deal of laboratory work has been done on this point but the results have not been very helpful. Harmless species are more often than not found to be quite as

easily infected as dangerous ones. For example, of the more common anophelines of Greek Macedonia, *Anopheles sacharovi* is the important vector, *Anopheles superpictus* a secondary vector, and two varieties of *Anopheles maculipennis* are not concerned in malaria transmission at all; yet Barber and Rice have shown that the most dangerous and the least dangerous species are equally susceptible to plasmodial infection, while the intermediate vector is more susceptible than either. However, in some other area this character might turn out to be of great importance. In Egypt, for instance, in spite of a widespread infection and an enormous production of anophelines, dissections of the vector species, *Anopheles pharoensis* give a very meager return of positives. *Anopheles pharoensis* can be infected in the laboratory, but we have no standards of comparison by which to judge its relative infectibility as compared, let us say, with *Anopheles elutus*, the principal vector of Palestine.

A more fertile field of investigation would seem to lie in the host preferences of anopheline species. No anopheline that we know of restricts itself to feeding on one kind of animal. Many of them like human blood but are not confined to it. Man is only one of a range of hosts which they willingly bite. He may stand at the head of the list or at the foot, or he may be excluded altogether. A few Anopheles in fact seem to have no contact at all with man and will starve to death in captivity if offered no other source of blood.

When man does figure as an acceptable host, we seem to find all degrees of attraction, from the almost exclusive attachment of *Anopheles gambiae* to the actual dislike of some of the fresh water *Anopheles maculipennis*, and in spite of the fact that certain individual animals and human beings attract mosquitoes more than others, in a given region and for a given species of insect the proportion of wild caught females containing human blood is fairly constant all the time. Thus more than 80 per cent of *Anopheles gambiae* caught in Africa, and 50 per cent of *Anopheles elutus* in Macedonia, but only 10 per cent of the variety *labranchiae*, and one-quarter of 1 per cent of variety *melanoon* in Italy give evidences of having fed on man. This proportion we have been calling lately the *anthropophilic index*, a clumsy attempt to avoid using the word "philanthropic."

Our present method of determining this index is also clumsy and consists in subjecting the stomach contents of captured insects to a precipitin test with antisera. Naturally the place of capture influences the results. Furthermore, there are many vector species which disappear after feeding and cannot be found. What we need is a convenient laboratory test applicable to sample groups of insects bred in self-sustaining captive colonies.

For it seems to me that the most important thing we can know about an anopheline species is the measure of its contact with man. A mosquito has to bite man on two separate occasions to transmit an infection, and the chances against its doing so operate independently each time. In other words, if one anopheline in 400 is attracted to man in certain parts of north Italy, only one in 160,000 will be likely to bite two different men. To refer again to our Egyptian studies, it is evident that *Anopheles pharoensis* is not a very efficient vector. It seems to produce a moderate amount of malaria only by dint of its enormous numbers. Where does man stand in the list of its normal blood donors? If near the foot, we would be encouraged to attempt even a small reduction in its numbers in the hope of checking transmission. Thus we see that in the phrases "a susceptible mosquito bites a malaria carrier," and "the infected mosquito then bites a

healthy person," the word *bites* conceals a highly restrictive factor on malaria transmission, which depends upon the attractiveness of man to the mosquito as compared with that of the domestic and wild animals of the locality.

The second step in the malaria cycle, the sexual multiplication of the parasite in the body of the mosquito, also provides an important restriction. For this takes time, and the margin between the period required by the parasite for development and the Anopheles life-span may not be large. Both James and Swellengrebel have suggested that the noteworthy lag of the malaria transmission season in England and Holland may be due to the short life of the vector in early summer consequent upon its sexual and nutritional activities. Low temperatures also inhibit the growth of the parasite to a greater degree than they do the metabolism of the insect, and may protract the sporogonic cycle beyond the life-span of its host.

High temperatures will have the same effect, by shortening the life of the insect. There is no quartan malaria for instance on the Nile delta, though it is common in neighboring countries and elsewhere in Egypt. Now it is characteristic of quartan that the cycle in the mosquito takes almost 4 weeks, twice that of the other species, so it may well be that under the excessively hot and dry climatic conditions of Egypt the local vector does not live long enough on the average to become infective. In the quartan areas nearby we invariably find *Anopheles sergenti* or *Anopheles superpictus* which are Near-Eastern mosquitoes adapted to desert life, but on the delta the only proved vector is *Anotheles pharoensis*, a marsh and rice field breeder. If this species fails entirely to transmit *Plasmodium malariae*, it may have difficulties also with *Plasmodium vivax* and *Plasmodium falciparum*, which might account for some of the discrepancy between anopheline density and malaria prevalence on the delta. Unfortunately we have not been able to devise a way of measuring the longevity of any anopheline species in nature; yet this is a factor of some moment in the epidemiology of malaria.

We have been considering some of the entomological factors which might influence the first three steps in the dissemination of malaria in a community, namely, local variability in anopheline susceptibility to infection, in its contact with man and in its average longevity. Let us now turn to the malaria carrier.

I have said that the appearance of sexual parasites in the blood stream of infected persons is transitory and unpredictable. We do know however of an important factor which tends to control the number of gametocytes and the frequency of their appearance. That is the growing immunity to malarial infection which comes from repeated attacks. The primary attack produces the most gametocytes, and each subsequent relapse or infection will have fewer and fewer. In an endemic locality there will be more carriers among the children than among the adults. The orphan asylum will be a more dangerous focus of malarial infection than the Old Folk's Home. Barber and Rice noted in Africa the epidemiological significance of a high birth rate. They found little difference in the amount of malaria in Liberian labor camps and in Nigerian villages, although the anopheline density was much less in the latter. This lower anopheline density was compensated in their opinion by the presence of a large population of young children in the villages, which was lacking in the camps. Swellengrebel and deBuck too, in small villages in North Holland, found the foci of malaria almost restricted to families with four or more children. Now that the age composition of populations is agitating the biostatisticians

everywhere, I feel that epidemiologists should pay more attention to the relative proportion of the younger nonimmune age groups in malarious localities.

We are turning in fact more and more to immunology to help solve our epidemiological problems. In malaria, the discovery of an indefinite number of parasitic strains in addition to the three established species of plasmodium has opened up a wide new field. Experiments with therapeutic malaria have shown that each species or strain rapidly builds up in the patient a solid and specific immunity to that particular parasite. You cannot create a chronic case of malaria in the laboratory. The more you strive to reinfect an individual with a given parasite, the more resistant he becomes, until enormous infective doses produce not the slightest reaction. But the different strains of *vivax* or *falciparum* are immunologically distinct, and a person can be infected with one after the other since there is but slight cross-immunity. It is the multiplicity of strains in any locality which builds up chronic cases and produces the well known picture of endemic malaria. The number of strains, then, locally present or imported on occasion from elsewhere, is an important point in the well-being of a community. The level of the group immunity which can be developed, the average splenic enlargement, the frequency of gametocyte carriers, the rate of transmission, and the age at which inhabitants will on the average establish a relative tolerance to malaria, will in some measure depend on this factor.

To return for a moment to Egypt, is it not remarkable that in the presence of such a great density of vectors breeding for 9 to 10 months of the year, there should be only sporadic or epidemic malaria? *Falciparum* is a mild infection in Egypt, hardly assuming the numerical or pathogenic importance one would expect in such a climate. I have sometimes wondered how many strains of it there may be about. But this is a factor we are not prepared to handle in the ordinary malaria survey.

There remains one more point to discuss in relation to gametocytes. Colonel Gill has recently questioned the prevailing opinion that their appearance in the blood is governed only by individual circumstances and hence is sporadic, irregular, and unpredictable. He points to the fact that the great periodic epidemics of malaria are explosive in character. Instead of spreading centrifugally from foci of infection like diphtheria and typhoid, they seem to break out simultaneously all over the epidemic area. He does not believe that such sudden and imposing phenomena are built up out of the meager parasitic elements to be found in the population in interepidemic periods. He attributes epidemic manifestations of malaria, both periodic and seasonal, to waves of relapses which for some unknown reason (perhaps meteorological) overwhelm populations at intervals like the waves of respiratory disease at certain seasons and in certain years. He is supported by the low incidence of infection in babies and the unimpressive mortality reported in the first weeks of such epidemics as that of Ceylon in 1934. He points to the fact that the spring peak of *vivax* malaria in temperate climates rises before anopheline breeding begins and must therefore be an epidemic of relapses. Why may not the autumn peak have the same genesis, he asks?

Colonel Gill, in my opinion, places too little importance on anopheline density, which can increase very rapidly under favorable conditions and is followed by a geometrically progressive multiplication of parasites in the population. Nevertheless, the theory deserves investigation. In other communicable diseases, such as pneumonia and scarlet fever, recent field studies reveal a curious reversal of what we have usually

taken for granted as the normal order of events. A large carrier group seems to appear in the population in advance of the epidemic clinical manifestations. In malaria we are confronted possibly by a new and hitherto unsuspected factor in epidemiology.

In summing up, I would like to point out that startling failures in correlation between anopheline densities and malaria prevalence in many areas have usually been explained vaguely and without proof as due to a hypothetical " resistance to infection " built up in the population as a result of a high standard of living, reflected in better nutrition, better housing, and better medical care. We must seek gradually to substitute for this easy generalization an orderly accumulation of data on factors which have hitherto escaped measurement but which must be influencing transmission in varying degree everywhere. Such factors are the relative susceptibility to plasmodial infection of anopheline vectors; the position of man in the order of their preferred hosts; and their life span in nature, both that characteristic of the species, and that imposed by environmental conditions. On the human side, the factors are concerned with the age composition of the population; group immunology as determined by the multiplicity of parasitic strains; and the possibility that gametocytes may appear in waves, in a large number of people at the same time, provoked by some natural external stimulus. Naturally the acquisition of such knowledge calls for new technics and a new type of field investigation in surveys of malarious localities.

Measures Instituted for the Control of Aëdes aegypti*

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IN military warfare it is an established fact of many centures' standing that, though the weapons themselves change, the principles of tactics are the same today as when Alexander conquered the then known world.

A parallel may be drawn on the health official's fight to control the *Aëdes aegypti*, the yellow fever mosquito. The big job still is to eliminate standing water from artificial containers near human habitation, just as it was for Gorgas, Carter, and Le Prince in the early days of the present century when yellow fever was stamped out of North America.

To continue the parallel with the military, as the army still considers the foot soldier the decisive element in winning its battles, the house-to-house inspector is still the " doughboy " of the *aegypti* fighters. Only by careful, painstaking inspections on foot can all of the artificial containers around premises that produce *aegypti* be found and either destroyed or controlled.

The habits of the *aegypti* mosquito are better known today then they were at the turn of the present century, and the inspector is trained to look particularly in certain places for larvae because this species prefers to breed in fairly clean water in places not exposed to direct sunlight. He has been taught to give each householder information about mosquitoes, their breeding places, and reasons why they should be controlled.

The inspector keeps record of all of the premises he visits, records the number of containers producing mosquitoes, the number of water-holding containers that could produce mosquitoes, and by symbols notes the kinds of mosquito producing containers found. He records places where his foreman should visit because of difficulties encountered, and also notes water-holding containers whose permanent correction has not been possible. To sum up, the main duty of the house-to-house inspector is to locate all mosquito producing containers and to eliminate permanently as many of them as he can.

A foreman is assigned a number of inspectors, depending upon local conditions. It is his duty to follow the inspectors to see if mosquito producing containers have been overlooked by them, to assign the inspectors to new areas as they work along, to spray oil on water-holding containers that cannot be emptied or drained, to investigate complaints about mosquito troubles in his district, etc. He checks over his inspectors' daily reports and summarizes their results in a daily report of his own.

The house-to-house inspections will

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reveal that there are always some water-holding containers that cannot be destroyed because they are put to some particular use. These include cisterns, wells, fish ponds and bird baths in yards and estates, cesspools, privies, water baths required in industrial processes, cemetery flower pots, floor drains in garages, outside drain boxes, catch basins, etc.

Control of such perpetual offenders is usually attempted by a "10 day" inspector. As the name suggests, it is his job to visit these offenders every 10 days or oftener. In most cases light Diesel engine fuel oil is applied to the water surface by hand operated compressed air spray guns. Catch basin breeding is usually controlled by applying oil from a motorcycle or a light truck equipped with an oil pressure tank, hose, quick operating valve, and extension spray nozzle.

In some cities, such as Key West, Fla., the citizens depend upon the storage of rainwater in cisterns located partly underground in yards for their drinking water. In a city of this kind cisterns could not be ordered destroyed because no other fresh water for drinking is available.

When the motorized *Aëdes aegypti* Control Unit of the U. S. Public Health Service was ordered to Key West in December, 1938, it was soon discovered that it would not be possible to institute measures to require all unprotected and improperly protected cisterns to be made mosquito proof immediately.

It was known, though, that top-feeding minnows had been used successfully in open containers in yellow fever control in Tampico, Mexico,[1] and Guayaquil, Ecuador,[2] and in malaria control.[1] Records of experiments showed that *Gambusia holbrooki* feed mainly by attacking food eagerly when it is in motion as in sinking, and it had been concluded that top-feeding minnows could not see if introduced into the dark covered cisterns, such as those so common in Key West.

It was found that *Gambusia* were found alive by our inspectors in some cisterns in which small numbers had been placed in 1935 by McCready of the Florida State Board of Health. Based on this information it was decided

FIGURE 1—A cistern unprotected against *Aëdes aegypti* mosquitoes, typical of many that were stocked with *Gambusia holbrooki* minnows

to stock every cistern in Key West unless it was constructed mosquito-tight, or unless the householder would not permit the cistern to be stocked and would agree only to the cistern's being oiled regularly by one of our inspectors. Cisterns were stocked using one adult fish per square foot of water surface, roughly, or 50 fish to an average cistern. The shallow fresh water wells also were stocked with *Gambusia.*

The laboratory experiments made by our entomologist disclosed that the ability of *Gambusia holbrooki* minnows to eat mosquito larvae seemed to depend more upon their appetite or capacity than upon the amount of light present. Also, none of the minnows "ate themselves to death" in the presence of a large number of larvae as has been reported for certain fish in the tropics used there in *aegypti* control.[3] A brief test was made with *Mollienesia latipinna*

FIGURE 2—A pile of old automobile tires in a second-hand yard that were producing *Aëdes aegypti.* Production was controlled by Paris green dusting.

which indicated that they would eat in darkness as well as in light. They are herbivorous, eating mosquito larvae *only in the absence* of plant food. Accordingly in nature they would be "virtually valueless as a destroyer of mosquito larvae."[4] Also, they were highly susceptible to handling and chlorination injuries.

Care was necessary in handling *Gambusia holbrooki,* the pregnant females being even more susceptible to handling and chlorination injuries than the delicate males. When reasonable care was exercised little harm resulted to either males or females, and they could be poured into cisterns or introduced with soup ladles through small openings when necessary.

These minnows were obtained from small fresh water ponds on adjacent Stock Island. They were acclimated by being placed in successive containers of pond-cistern and of cistern waters.

As means of protecting himself against criticism for possibly introducing contamination into those cisterns that he had stocked with *Gambusia,* the sanitary officer of Monroe County, Fla., had subjected the minnows to an overnight bath in chlorinated water before introducing them into cisterns. This practice was continued by us, and experiments to find the tolerance of *Gambusia holbrooki* to chlorinated water, plus experience gained, resulted in the use of dosages of hypochlorite that would produce a chlorine residual of 0.1 to 0.15 p.p.m. Over-contact with chlorinated water always caused high mortality of fish.

A survey of the Key West cemetery showed extensive *aegypti* breeding in flower containers. Pellets were made of a wet mixture of 1 part of Paris green and 4 parts of plaster of Paris. One pellet was placed in each flower vase. In the third inspection of 631 flower containers that contained *aegypti* larvae before the pellets were added only 3

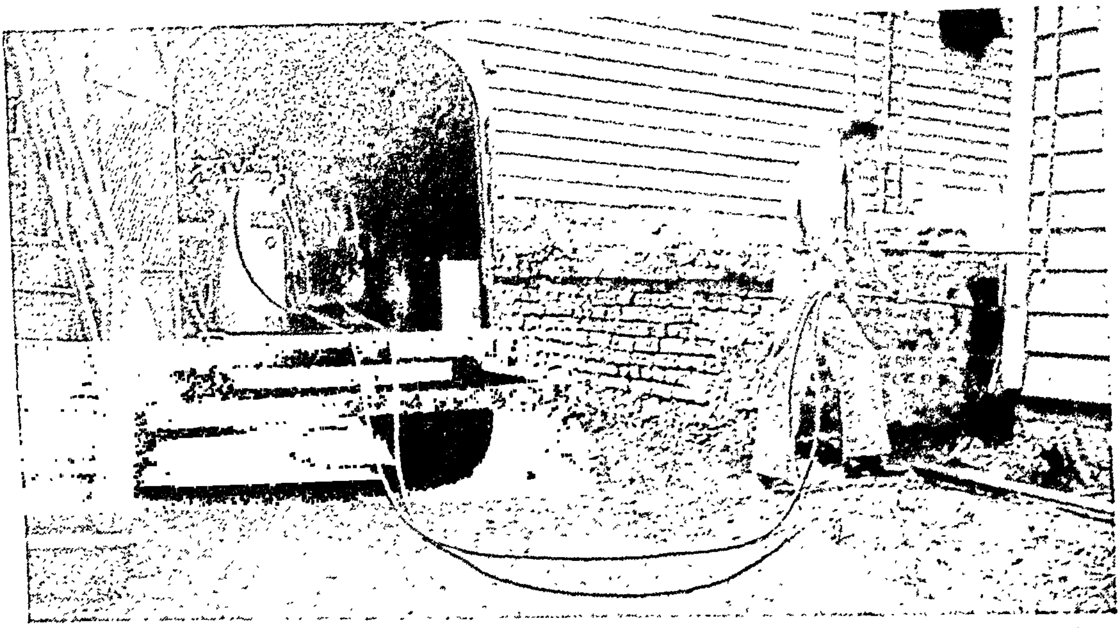

FIGURE 3—Unused cistern not mosquito-tight being sprayed with oil, using a power driven oil spraying unit

were found breeding. Additional pellets were added during each inspection.

All cisterns not stocked with *Gambusia* were sprayed with sufficient kerosene every 10 days to form an unbroken film on the water surface. Kerosene evaporates quickly and there was little danger of its being drawn into the water pipes because the drop pipes of the suction pumps extended down almost to the cistern bottoms.

It was found that *Gambusia* were not able to remove heavy infestations of larvae from cisterns. In these cases the cistern was first sprayed with kerosene to kill the larvae, and *Gambusia* were introduced later to prevent re-infestation. Apparently the kerosene film was not harmful to the *Gambusia*.

Occasionally severe infestations of adult mosquitoes were found inside houses, under houses, etc. To disinsecticize these places they were sprayed thoroughly using a mixture of 1 part of a concentrated extract of pyrethrum in oil (extract from 20 pounds pyrethrum flowers to each gallon) and 4 parts of light oil (refined kerosene). A pressure spray gun operated by a portable air compressor was used. The Public Health Service now is trying out a large insecticide spraying truck designed for this purpose.

In the *aegypti* control activities of the Public Health Service the *Aëdes aegypti Index* used currently by mosquito control workers has been employed as a means of observing the progress made in reducing the *aegypti* infestation in a community or any selected area. Stated briefly, it is the percentage of premises inspected found producing mosquito larvae multiplied by the percentage of samples collected containing *aegypti* larvae. The first mentioned percentage discloses the index of "domestic" mosquitoes and multiplying it by the percentage of samples containing *aegypti* larvae is an attempt to arrive at a figure that will indicate the infestation of *aegypti*. Samples of larvae were collected from every piece of property where domestic mosquito production was found by the evidence of larvae present. The collections were identified later by the entomologist.

To discover how long *Aëdes aegypti* eggs would remain viable when kept in the dry state and at room temperature, Sanitary Engineer H. A. Johnson, U. S.

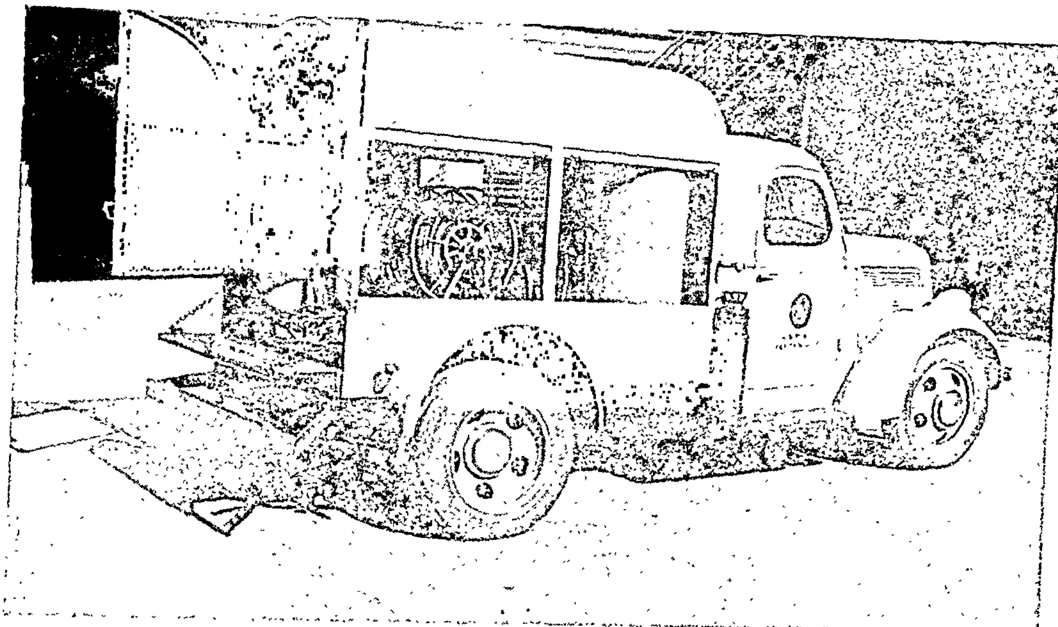

FIGURE 4—Power driven insecticide spraying truck designed by the U. S. Public Health Service. (*It is also used for spraying oil larvicide.*)

Public Health Service, when on duty in Miami, Fla., began an experiment by placing away, on June 12, 1938, 4 wooden egg troughs on which *aegypti* eggs had been laid. Exactly 1 year later when they were placed in water the author was able to find a few larvae hatched out after a day's immersion. Several larvae that were set aside were reared through to the adult stage. There is record of Passed Asst. Surgeon (later Medical Director) Edward Francis at Mobile, Ala., having placed away *aegypti* eggs August 16, 1906, and having hatched them out 6½ months later. They were reared through to adults.[5] These experiments demonstrated that *Aëdes aegypti* will survive a southern winter in the egg stage as well as by adult hibernation.

CONCLUSIONS

The control of *Aëdes aegypti* is accomplished only by repeated painstaking inspections from house to house to find and to eliminate *all* artificial containers that produce them.

Gambusia holbrooki were used successfully in Key West, Fla., to control *aegypti* production in dark covered drinking water cisterns. These minnows were subjected to an overnight bath in chlorinated water before being placed in the cisterns.

Houses with a severe infestation of adult mosquitoes were disinsecticized by spraying with a concentrated pyrethrum extract in oil.

Aegypti production in cemetery flower vases in Key West was controlled by placing Paris green pellets in them.

It is possible for *Aëdes aegypti* eggs to remain viable in the vicinity of Miami, Fla., at least one year.

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Epidemiology of Acute Coccidioidomycosis with Erythema Nodosum*

("San Joaquin" or "Valley Fever")

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FROM its initial recognition in 1892 [1, 2] until 1936 coccidioidal granuloma was deemed the sole manifestation of coccidioides infection. To most of us this granuloma was noteworthy because of the bizarre character of the causative fungus, *Coccidioides immitis*, its notorious clinical and pathological mimicry of tuberculosis, its 50 per cent fatality, and the fact that most of its recognized victims resided at some time in the southern (San Joaquin) half of the great Sacramento-San Joaquin Valley of California. However, its incidence was infrequent even in this endemic area. That the infection apparently never occurred in an inapparent or benign form escaped notice. Then came what Meyer [3] has called "the Renaissance" of our knowledge of coccidioides.

For at least fifty years the southern San Joaquin Valley has also been the site of a disease known locally as "San Joaquin fever," "San Joaquin Valley fever," "valley fever," "desert fever," or "desert rheumatism." Characteristically the illness consists of an influenzal-like initial phase followed in 2 to 18 days by the eruptive phase of erythema nodosum and less frequently erythema multiforme. The skin lesions are frequently associated with arthritis and conjunctivitis (often phlectenular). The eruption lasts from 6 days to 3 weeks and, as the lesions fade, pigmented areas remain for months. Recovery is practically invariable. The disease, so far as can be ascertained, was never described in the medical literature until 1936 when Gifford [4-6] and Dickson [7-10] established that this illness is really a benign form of coccidioides infection or "coccidioidomycosis."

A coöperative field and laboratory study of "San Joaquin fever" was undertaken in the two counties where the incidence has been greatest. An attempt was made to interview and examine every person who had this illness. The organization of the field work has been described elsewhere.[11]

During the 17 months from December 7, 1937, to May 12, 1939, 432 patients of Kern and Tulare Counties were seen with erythema nodosum or

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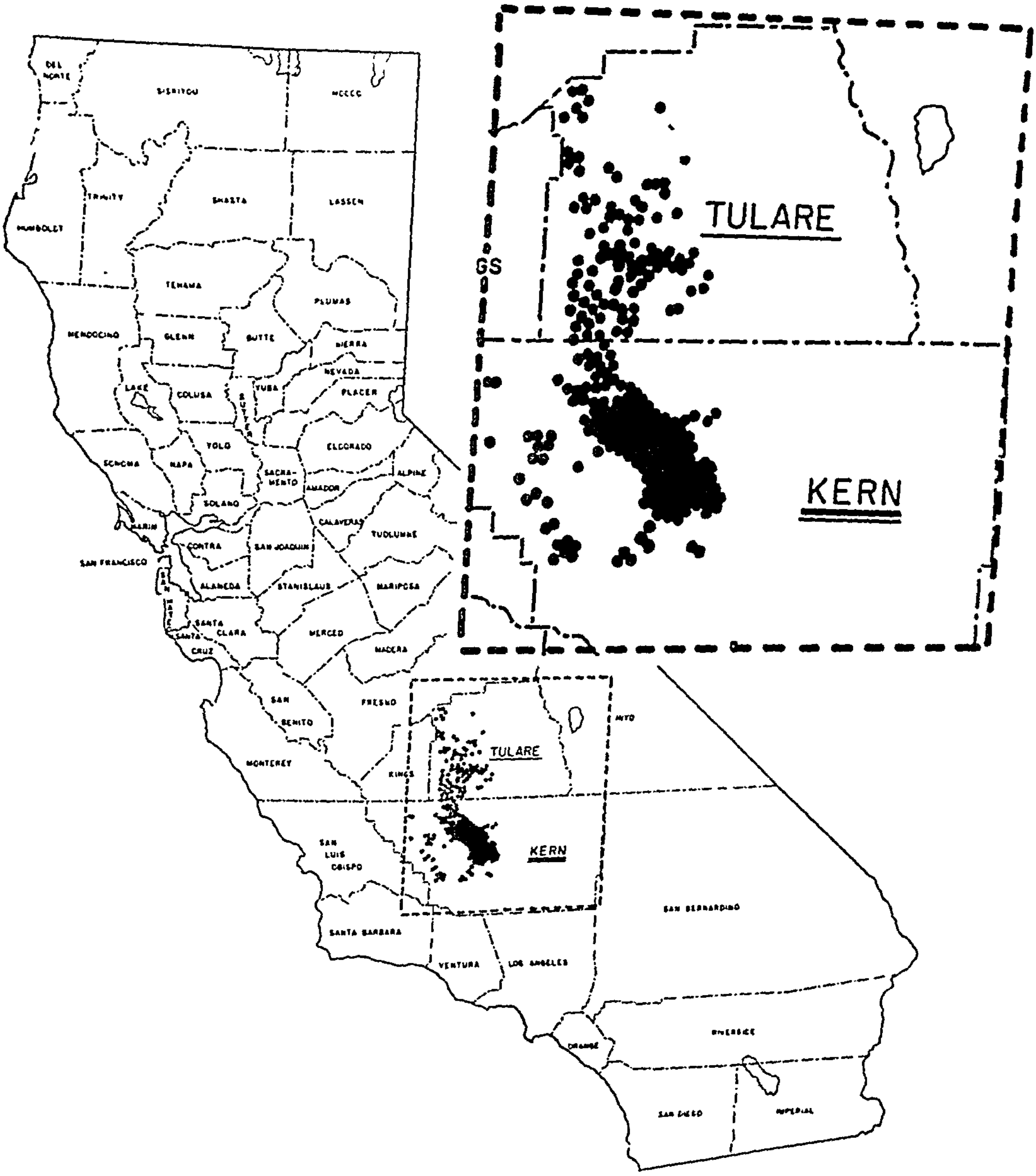
* Read before the Epidemiology Section of the American Public Health Association at the Sixty-eighth Annual Meeting in Pittsburgh, Pa., October 17, 1939.

NOTE: Supported by the Rosenberg Foundation, the study is in collaboration with the County Medical Societies, County and City Health Departments, medical institutions, welfare organizations and the large ranches of Kern and Tulare Counties. Especial appreciation is expressed to Dr. M. A. Gifford, Chief Assistant Health Officer of Kern County.

Figure 1—Distribution of "San Joaquin Valley Fever" patients seen during period December, 1937, to May, 1939, in Kern and Tulare Counties



multiforme caused by *Coccidioides immitis* (Figure 1). Twenty other patients were reported by physicians but could not be located.

The criterion for this series was the clinical picture of erythema nodosum and/or multiforme and, if a coccidioidin test[12] was performed, a positive reaction. Twenty patients refused the tests, mainly on religious grounds. However, in 5 the fungus was recovered from their sputa. Thus in only 15 patients were the typical signs and symptoms unsupported by additional evidence. Possibly 1 or 2 might have had erythema nodosum due to another cause, for during the study 21 other patients were seen with erythema nodosum having etiologies other than coccidioides infection. These excluded erythema nodosum patients had atypical clinical pictures, were negative to coccidioidin, and in none was the fungus recovered from the sputum. However, *Mycobac-*

terium tuberculosis was found in 4 of the 11 with positive Mantoux tests, all of which were very severe. Since 95 per cent of the erythema nodosum of the region appeared to be caused by *Coccidioides*, it seemed more accurate to include the 15 unconfirmed cases than to exclude the entire group. Only 2 patients in the series had clinical pictures which were not clear-cut. They were included since they were the only patients who may have been suffering second attacks of "San Joaquin fever."

It did not seem justifiable to demand recovery of the fungus as criterion for inclusion. Many patients did not raise sputum. Even more had ceased to produce sputum by the time specimens were requested. Since 80 per cent of the patients did not see a physician until after the appearance of erythema nodosum, examinations were possible in only 225 (54 per cent). The sputum examinations consisted of cover slip examination, acid fast stain for *Mycobacterium tuberculosis,* culture and guinea pig inoculation. *Coccidioides immitis* was reported only when proved by animal inoculation and growth of the fungus. *Coccidioides* was recovered from 95 (42.4 per cent); 37 (16.5 per cent) were negative, while in 92 (41.1 per cent) the results were equivocal (cultures overgrown, animals died prematurely). Excluding these equivocal sputa, 72 per cent of the remaining 132 sputa were positive.

The diagnostic importance of the erythema nodosum was very apparent. The general nature of the pre-nodosum symptoms resulted in the usual diagnosis of "flu" by the victim or the physician if he was called. With more severe symptoms physicians diagnosed pneumonia frequently, lung abcess, typhoid fever, poliomyelitis and brain tumor. Severe pleurisy resulted in diagnosis of pyelitis, renal colic, gall bladder colic twice, fractured ribs twice (both treated under industrial compensation), and appendicitis twice (both with appendectomies). A frequent rash ("toxic erythema") appearing 2 or 3 days after onset of symptoms was often misdiagnosed measles by physicians and laity.

As has been mentioned, only 20 per cent of the patients sought medical aid before the erythema nodosum. These lesions frightened them sufficiently to go to their physicians. Only rarely did the physicians fail to diagnose the erythema nodosum. However, erythema multiforme twice resulted in diagnoses of eczema and six times in those of smallpox.

On the other hand, popularization of the diagnosis threatened to make symptoms of fever and malaise into "San Joaquin" as frequently as they do "flu" in most localities. Patients were diagnosed "San Joaquin fever" when they were suffering from acute appendicitis, lead poisoning (colic), smallpox, and syphilis (secondaries). As noted above, 11 patients supposedly suffering from "San Joaquin fever" had erythema nodosum due to tuberculosis.

None of the 432 patients of this service have developed coccidioidal granuloma or other serious sequelae up to the present time.

INCUBATION PERIOD

Two patients provided exact incubation periods and another to within 2 days. The first was a laboratory infection [7, 8, 10] in which Dr. H. D. Chope, then a medical student, accidentally inhaled a massive dose of coccidioides spores and 9 days later had his onset of what is now recognized as "San Joaquin fever." Another perfect incubation period was in a San Francisco housewife who stayed one night in a Valley town and developed "San Joaquin fever" 13 days later. The third patient had an incubation period between 14 and 16 days. By questioning patients as to their movements other incubation

periods were bracketed as follows: several patients had been in the Valley only 22 days, others 21, 19, 15, 11, and 8 days, respectively. Patients who had left the Valley and had onsets elsewhere were more difficult to locate, but 2 of these minimal incubation periods were 9 and 14 days. The incubation periods ranged between 1 and 3 weeks, probably falling most frequently around 2 weeks.

RELATION OF COCCIDIOIDIN SENSITIVITY TO ERYTHEMA NODOSUM

The association of erythema nodosum with tuberculosis is well known, as exemplified by the epidemic which Brandon and his associates reported.[13] For 30 years the Scandinavians have presented convincing evidence in support of this etiological relationship. Wallgren, one spokesman of this group, stated[14] that while 95 per cent of the Swedish erythema nodosum is associated with tuberculosis, it is really the manifestation of nonspecific allergy. During the primary infection when the tuberculous allergy is first established, sensitivity to tuberculin is maximal. This hypersensitivity is held responsible for the appearance of the erythema nodosum.

Now another chapter has been added to the coccidioidomycosis mimicry of tuberculosis. Coccidioidin tests made during this study were in complete accord with the theory expressed by Wallgren. The development of the coccidioidin sensitivity also evidenced the specificity of the reaction. We had many patients with records of negative coccidioidin reactions from 1 month to 1 year prior to the "San Joaquin fever." Even more significant were the first 5 patients in Table 1 with coccidioidin reactions which were negative in the initial phase of their illness and positive after erythema nodosum appeared.

The last 2 patients of Table 1, though they did not develop erythema nodosum and therefore were not included in the series of 432, provide accurate information regarding the onset of coccidioidin sensitivity. From both *Coccidioides* was recovered.

TABLE 1

Time Intervals between Clinical Onset, Erythema Nodosum Coccidioidin Reactions in Certain Cases of Acute Coccidioidomycosis

	Period in Days from Onset Until:		
Patient	*Negative Coccidioidin*	*Erythema Nodosum*	*Positive Coccidioidin*
J.C.B.	2	17	19
O.G.	3	11	12
J.A.J.	8	15	20
A.S.	10	18	20
J.W.	17	21	40
J.D.	—	3	3
T.Y.*	—	6	4
B.B.*	—	10	8
A.C.*	—	12	6
M.M.*	4, 9	13	11
R.R.†	11	—	14
E.B.†	1 (or 2)	—	2 (or 3)

* Note positive coccidioidin prior to erythema nodosum.

† Never developed erythema nodosum.

The other patients in Table 1 demonstrate that sensitivity had been established prior to the eruption. One patient, Mrs. M.M., provided a complete picture of this sensitivity relationship. Her coccidioidin reaction became positive between the 9th and 11th days of her illness and erythema nodosum developed on the 13th day. *Coccidioides* was recovered from her sputum collected on the 4th day.

Thus sensitivity may be established from 2 to 17 days after the onset of symptoms, probably generally between 1 and 2 weeks. If erythema nodosum does develop, it appears shortly thereafter.

The hypersensitivity which characterizes patients with erythema nodosum was first noted by Gifford.[4] Dickson[8, 10] subsequently made similar observations. Only 0.1 mg. of our coccidioidin occasionally caused vesiculation in "valley fever" patients.

Ernberg[15] reported recurrences of

tuberculous erythema nodosum after violent tuberculin reactions. Kessel[16] had a similar experience with coccidioidin in a convalescing "San Joaquin fever" patient. None of our patients were known to have had similar relapses. Twice multiform lesions on the margins of the palms flared up after severe coccidioidin reactions and frequently such reactions developed satellite vesicles which resembled the original lesions.

DURATION OF SENSITIVITY TO COCCIDIOIDIN—SECOND ATTACKS OF "VALLEY FEVER"

The fact that tuberculous erythema nodosum rarely recurs may be the consequence of two factors: (1) the usual retention of the specific allergy; (2) the apparent association of the requisite hypersensitivity with the change from negative to positive reaction. The rare "post primary" type of tuberculous erythema nodosum has been explained[15, 17] as the result of loss of allergy after some acute infection (e.g., measles or whooping cough). The return of allergy then has the effect of the primary infection in promoting hypersensitivity.

Again the analogy with "San Joaquin fever" seems to hold. Only one or two of the Kern and Tulare County doctors had ever diagnosed two attacks of "San Joaquin fever" in the same patient. It should be recalled that the diagnostic criterion of "valley fever" has been erythema nodosum and that during this study 21 patients were observed suffering erythema nodosum due to causes other than coccidioidomycosis. Two attacks of these skin lesions might well have different causes.

To ascertain the duration of the skin sensitivity, 0.1 mg. coccidioidin tests were performed on apparently healthy volunteers who previously had experienced clinically typical "San Joaquin fever." The reactions of these patients were strongly positive. One, tested 21 years following her erythema nodosum gave a reaction of 48 mm. However, these persons lived in the endemic area and could have maintained their allergy by reinfections. Fortunately, our colleague, Dr. H. D. Chope, who had coccidioidomycosis in 1929, has had no possible contact with the fungus since 1932. In 1938, 9 years after his known infection and 6 years after any contact with *Coccidioides*, he had his first, and doubtless last, coccidioidin test. For with only 0.1 mg. of coccidioidin the resultant erythema and induration measured 60 x 80 mm. and the vesicle which subsequently necrosed measured 15 x 17 mm. Evidently the allergy is of long duration. The findings of Cox and Smith[18] indicate that the fungus remains walled off in some focus.

This permanence of the coccidioidin reaction probably explains why only 2 of the 432 patients may have had two attacks of "valley fever." One patient probably had "valley fever" in 1939. Her history indicated a previous attack of erythema nodosum in 1937. However, we cannot be certain that her previous illness was acute coccidioidomycosis since neither sputum examinations nor coccidioidin tests were made at that time.

In 1937 the second patient had typical "valley fever" proved by recovery of the fungus. Her illness 10 months later appears to have been "valley fever" although the story is not absolutely clear-cut and she raised no sputum which could be examined for *Coccidioides*.

Even if these two are deemed bona fide second attacks, the ratio of second to first attacks would only be 1:200. "Post primary" erythema nodosum of coccidioidomycosis is at least as infrequent as is that of tuberculosis.

SOURCE AND MODE OF TRANSMISSION

Most investigators have deduced that coccidioides infection is generally ac-

quired by the inhalation of the fungus.[5-10, 12, 19-22] In our department 3 laboratory infections proved by recovery of the fungus and 15 others indicated by positive coccidioidin reactions, must have been acquired by inhalation. There is no evidence that the insects, animals, food and water of the San Joaquin Valley could have affected these San Franciscans. Moreover, the sporadic incidence ruled out contact infection.

The field investigation gave additional evidence that the acute infection does not pass from person to person. Only 98 of the 432 patients did not share a bed with at least 1 other member of the family, and 34 patients slept with 4 or more other people. However, only 3 patients had onsets within the possible period of incubation of family infection (2 after a 3 week and 1 after a 5 week interval). On the other hand, 17 patients of this series had slept with other members of the family while the latter had suffered more remote attacks. One boy slept with his 2 older brothers who had "valley fever" 1 and 2½ years before his attack. The fact that these 17 patients ultimately developed the disease established their susceptibility. The fact that they did not acquire the primary infection of coccidioidomycosis from their bedfellows during any conceivable incubation period indicated that the *Coccidioides* spherules did not pass from man to man. It seems justifiable to conclude that the endosporulating spherules of *Coccidioides* which occur within the animal host and are found in the sputum are rarely if ever infectious. Responsibility lies with the chlamydospores characteristic of the fungus in nature and readily adapted to widespread dissemination.

Where the fungus grows has not as yet been established. Certain factors must restrict its distribution despite the fact that it will grow on many simple substances.[23, 24] Indeed, *Coccidioides* was recovered from soil near Delano by Stewart and Meyer.[25] However, even this discovery did not indicate whether the soil provides the culture medium or merely acts as a means of dissemination. Individual case histories and seasonal distribution emphasize the importance of dust.

SEASONAL DISTRIBUTION

The monthly distribution of the "San Joaquin fever" onsets is presented in Table 2 and Figure 2. The field visits began December 7, 1937, but not until the middle of January, 1938, were all of the physicians visited. Therefore comparison of monthly onsets should begin with January, 1938.

We observed that the seasonal incidence was well defined. It followed the climate and the agricultural activities after a lag of 1 to 3 weeks corresponding to the incubation period. The wet season with little field work showed fewest cases. In 1937 the rains began on December 8. Even the incomplete tabulation of cases for the last month

TABLE 2

Seasonal Distribution of San Joaquin Valley Fever Onsets
Kern and Tulare Counties

Year Month	*First Half*	*Second Half*	*Total*	*Year Month*	*First Half*	*Second Half*	*Total*
November, 1937	—	9	9	August, 1938	22	30	52
December, 1937	10	10	20	September, 1938	15	25	41
January, 1938	5	5	10	October, 1938	35	20	65
February, 1938	7	7	14	November, 1938	20	25	45
March, 1938	6	2	8	December, 1938	24	10	34
April, 1938	3	6	9	January, 1939	9	5	11
May, 1938	4	7	11	February, 1939	6	5	11
June, 1938	8	13	21	March, 1939	10	15	[illegible]
July, 1938	20	16	36	April, 1939	5	5	[illegible]

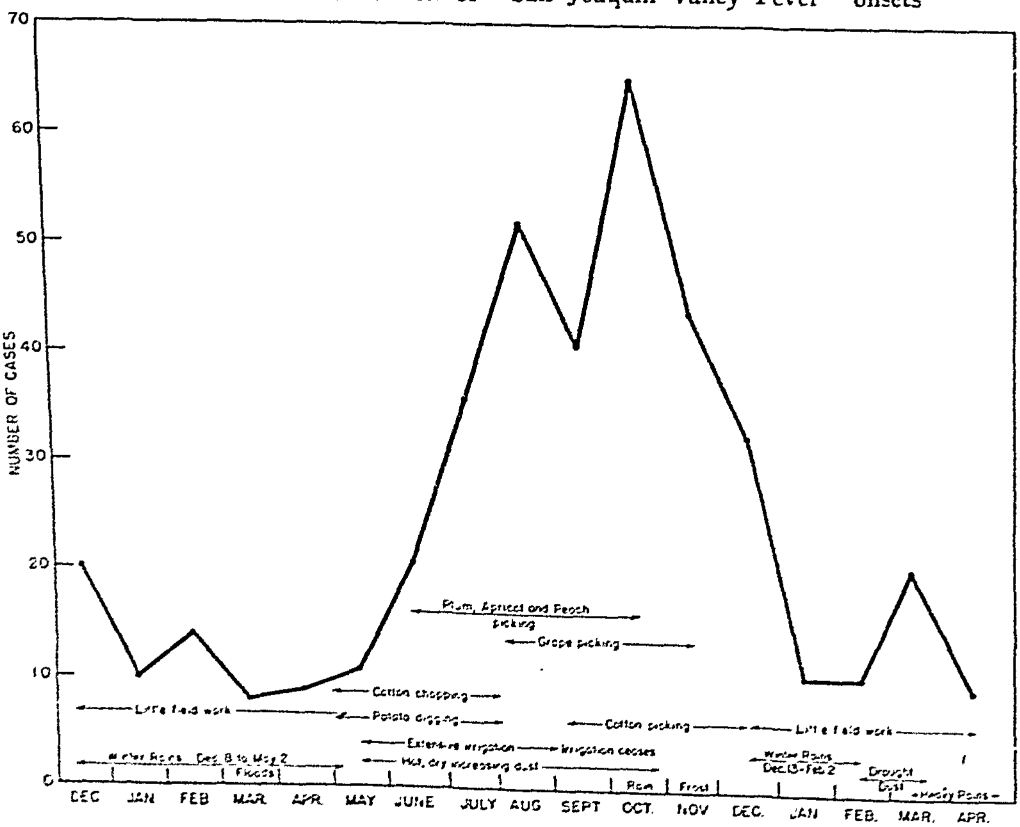
and a half of 1937 demonstrated a much higher incidence than occurred in the subsequent winter and spring. The local physicians all declared that the 1937 "valley fever" season ended in December. Particularly striking is the comparison between wet 1938 and dry 1939. The heavy winter rains of both years began at approximately the same time and the incidence for January and February of both years was nearly the same. However, at the end of February and the forepart of March, 1938, heavy floods occurred. In 1939 the rains ceased after February 8 and drought developed. While wet 1938 had 8 March cases, dry 1939 had 24. In late March, 1939, rain finally came and April produced only 10 onsets. As Figure 2 indicates, with the advent of the spring and early summer the dry weather and field work (potato digging, cotton chopping and fruit picking) were associated with progressively increased incidence of coccidioides infection. In the hot summer and fall, irrigation ceased and dust became exceedingly heavy. Then the peach, grape, and cotton picking brought thousands into the fields and "San Joaquin fever" reached its peak in October. After light fall rains the incidence reduced but did not become minimal until after real winter arrived.

The evidence of this seasonal distribution supports the inhalation route with dust as the medium of dissemination for *Coccidioides* chlamydospores. One conceivable objection is that some onsets do occur in the wet season. However, in the lower San Joaquin Valley, even a few hours after heavy rains, wind will raise dust.

PREDILECTION FOR SPECIAL GROUPS

Because 87.5 per cent of the patients came to the region since the last census, no rates for different localities could be calculated. Similarly, age specific rates

FIGURE 2—Seasonal distribution of "San Joaquin Valley Fever" onsets



would be meaningless. Patients' ages ranged from 15 months to 69 years. Table 3 shows that approximately one-quarter of the cases were in the 10–19 year group and even more in the succeeding decade. The high proportion in the younger ages is doubtless the consequence of the age distribution of the non-immune newcomers.

TABLE 3

Age Distribution of San Joaquin Valley Fever Patients

Kern and Tulare Counties November, 1937, to May, 1939

Age	*Number*	*Percentage of Total*
0– 9	45	10.4
10–19	110	25.5
20–29	119	27.5
30–39	76	17.6
40–49	49	11.3
50–59	24	5.6
60–69	9	2.1
Total	432	100.0

TABLE 4

Sex Distribution of Valley Fever Patients by Age and Ratio of Males to 100 Females

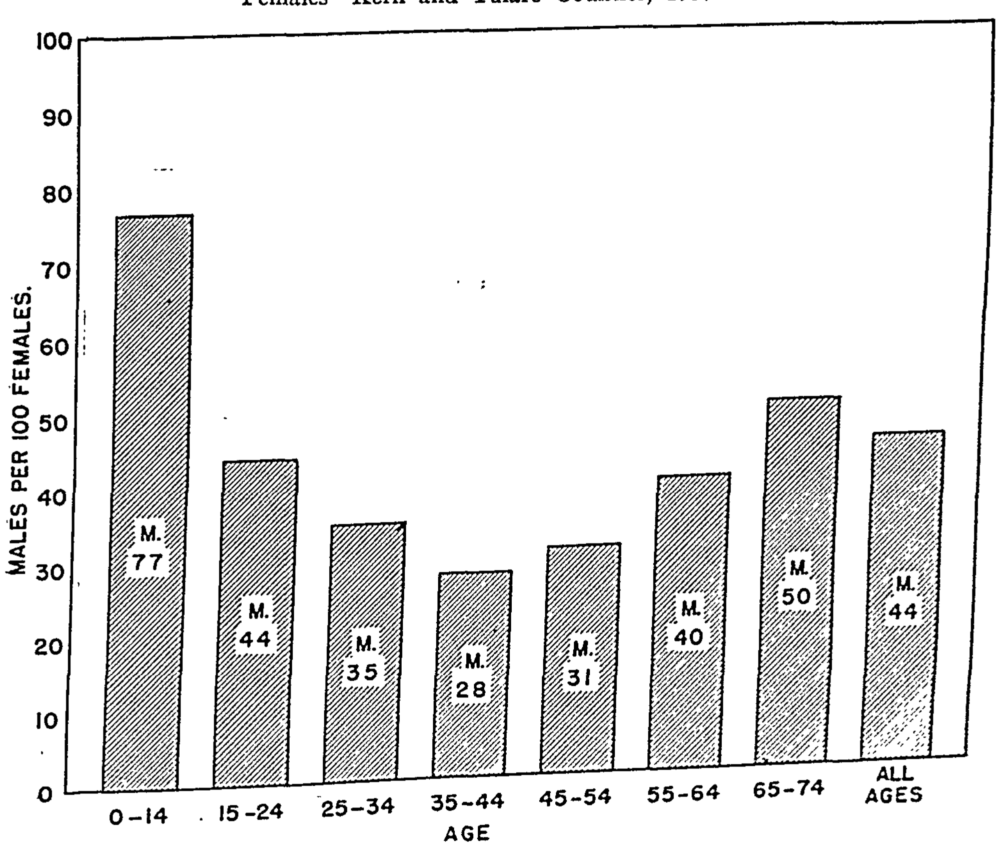
Kern and Tulare Counties, 1937–1939

Age	*Number*		*Males per 100 Females*
	Males	*Females*	
0–14	44	57	77
15–24	31	70	44
25–34	28	80	35
35–44	15	53	28
45–54	9	28	31
55–64	4	10	40
65+	1	2	50
Total	132	300	44

Table 4 shows that one-third of the male cases were under 15 and that thereafter the proportion diminished steadily. However, only one-fifth of the females were in the school group and the proportion increased for two decades before diminishing.

The predilection for females is noteworthy. It is in line with the experience

FIGURE 3—Sex Distribution of Valley Fever Patients by Age and Ratio of Males to 100 Females—Kern and Tulare Counties, 1937–1939



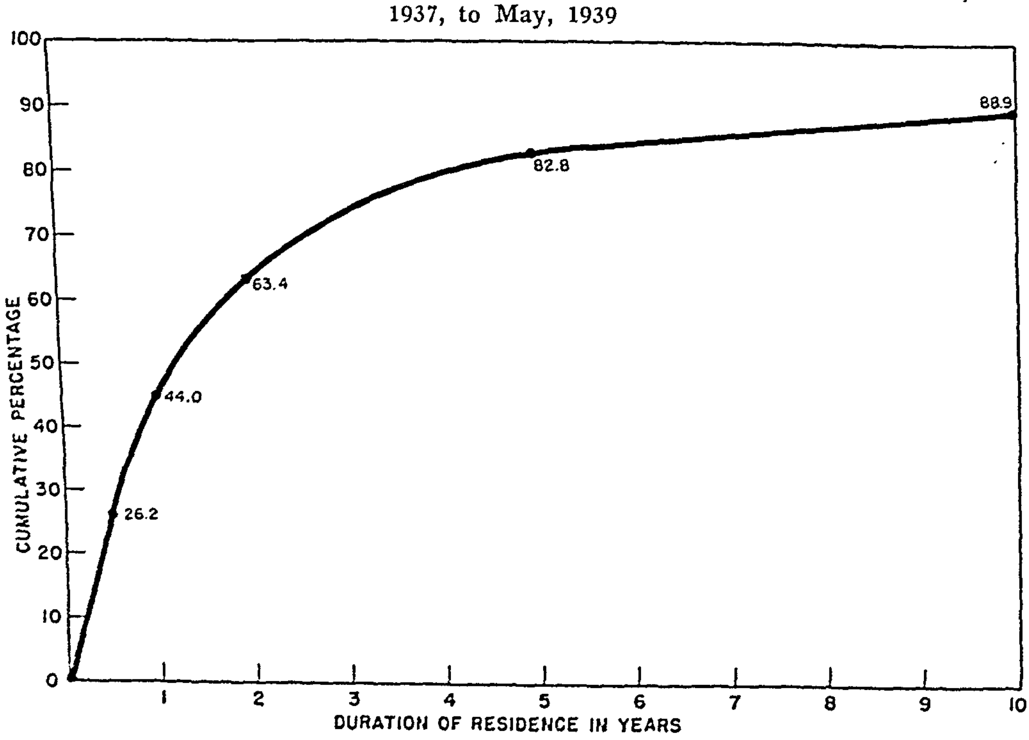
in tuberculous erythema nodosum. Under the age of 15 (Figure 3), the ratio of 8 males to 10 females was not striking. However, from puberty to menopause the females greatly outnumbered the males. In the fifth decade there were only 2 males per 10 females although here the numbers were small. For the entire group there were only 4 males to 10 females. On the other hand in coccidioidal granuloma this ratio is reversed: 40 to 70 males per 10 females.[5, 26]

The rarity of coccidioidal granuloma in "San Joaquin fever" patients is further emphasized in the racial distribution of the patients. Again population statistics for specific rates are not available. None of the 432 patients were Negroes, only 2 were Filipinos, and 2 were Japanese. The local physicians said that their experience was similar. This exceedingly small incidence of benign "valley fever" stands in contrast with the predilection of coccidioidal granuloma for Negroes and Filipinos.[5, 6] Gifford[5] estimated that the Negro coccidioidal granuloma death rate of Kern County has been 23 times the white rate, and that for the Filipino 170 times the white. This difference could not be accounted for by occupation nor by better housing, nutrition, or sanitation. On the contrary, the whites have equally extensive occupation exposures.

Moreover, as most of the Filipinos live on large ranches, they have good bunk houses and are well fed. The well publicized poor housing and malnutrition of the migrant whites did not result in much granuloma.

Adverse social and economic conditions had no detectable influence on development of "valley fever." While most patients were underprivileged migrants, many were in relatively good circumstances and some well to do. One's impression was that they represented a cross-section of the newcomers, for the feature in common was recent arrival in the San Joaquin Valley.

FIGURE 4—Length of residence in San Joaquin Valley expressed as cumulative percentage of all 432 Valley Fever Patients of Kern and Tulare Counties, seen from December, 1937, to May, 1939



migratory workers have swarmed into the floor of the Valley. As these newcomers acquired their *Coccidioides* infections, perhaps 1 in 20 * developed erythema nodosum. The 432 "San Joaquin fever" patients must have represented fully 8,000 to 10,000 new infections with *Coccidioides immitis*. If no new groups appear, the experience on the West Side should be repeated on the Valley floor. Eventually most of the inhabitants of the region will undergo an infection with *Coccidioides*. During the next 10 years, the number of "valley fever" cases should diminish rapidly and the proportion of cases in children steadily rise. Thus the economic and sociological dislocations responsible for the mass migration of this period have provided the bases of this study.

SUMMARY

1. An investigation was made of 432 patients with "San Joaquin fever," "valley fever," or "desert rheumatism" in Kern and Tulare Counties during the 17 months beginning December, 1937. All recovered without sequelae.

2. This disease, characterized by influenza-like prodromes followed by erythema nodosum with or without erythema multiforme, was frequently confused with such communicable diseases as influenza, pneumonia, tuberculosis, measles, and smallpox, and occasionally even with poliomyelitis, typhoid fever, and syphilis.

3. The incubation period ranged between 1 and 3 weeks, probably most frequently requiring 2 weeks.

4. Sensitivity to coccidioidin, a product of the causative fungus, *Coccidioides immitis*, was established in from 2 to 17 days after onset of symptoms, generally in the second week of the illness.

5. The erythema nodosum was associated with the hypersensitivity of freshly acquired allergy. This allergy, apparently like tuberculin sensitivity, was of long duration. Consequently, second attacks of "San Joaquin fever" were very rare (not more than 2 in this series).

6. Coccidioidomycosis with erythema nodosum was rarely if ever contact infection. The endosporulating spherules of *Coccidioides* occurring in man and animals did not pass directly from host to host. Apparently, the disease was acquired by inhalation of the chlamydospores.

7. The seasonal incidence corresponded to the climate and the agricultural activities, with the peak in the dusty fall and the ebb in the wet winter.

8. The benign "valley fever" was most common among white females in contrast with coccidioidal granuloma which is known to be especially prevalent among dark-skinned males.

9. Nearly half the patients had resided in the San Joaquin Valley less than 1 year, while only one-ninth had been in the region 10 years or more. The predilection for newcomers corresponded with the distribution by length of residence of coccidioidin sensitivity.

10. Eventually most of the inhabitants of the region undergo an infection with *Coccidioides*. As not more than 5 per cent of those infected develop erythema nodosum, this series represented between 8,000 and 10,000 attacks of coccidioidomycosis.

* Out of 143 Maricopa reactors only 4 gave a history of "desert rheumatism" and of 76 Porterville High School reactors, Campbell[27] found only 1 who had experienced "valley fever," or a total of 2.2 per cent in 219.

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A Community Plan for Dental Care in Relation to a National Health Project

REPORT BY THE COMMITTEE ON COMMUNITY DENTAL SERVICE OF THE NEW YORK TUBERCULOSIS AND HEALTH ASSOCIATION

"AN adequate program for public health service, whether it be state, socialized, or insurance, and whether it be on a national, state, or local basis, must include dental treatment; and if the medical service is to be adequate, so also must be the dental service. While on its face this may appear to be a simple statement, its implications are more complex than may at first be apparent. . . . It is worthy of note that in previous studies and surveys for the purpose of planning a public health program, careful consideration of a dental service has been neglected."

This quotation from a paper by Walker[1] is as apt today as when published in 1935.

The need for a national health program, long urged, and recently affirmed by the American Medical Association, may now be said to have universal acceptance. Public health authorities also are becoming more and more concerned with dental conditions existing in the country as they enter into the complete public health picture. They are in agreement that no community health program is complete unless it includes dental care. Therefore, there is urgent need at this time, when health service plans are being formulated apace, that dentistry's position be clearly stated and promulgated. *This plan is not issued as a proposal coming from the dental profession but as a statement of what dentists believe would be a workable dental program in a national health project.*

It has often been noted in documents dealing with measures for protecting or enhancing general health that dental care is not mentioned, because the need for it is taken for granted. When dentistry is mentioned, this is done in such a way as to convey the impression to the layman that dental service is entirely analogous to other health services and can be provided and administered in the same way as, for example, a tuberculosis or syphilis service. Furthermore there is almost complete lack of understanding even among well informed health workers, of the prevalence, characteristics, and consequences of dental disease; these have been stated before and need not be repeated here.

In proposing a dental plan for a national health program, full cognizance

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NOTE: Issued by the Committee on Community Dental Service of the New York Tuberculosis and Health Association, John Oppie McCall, D.D.S., Chairman, New York, N. Y., through its Sub-committee on Dental Participation in Tax-supported and/or Voluntary Insurance Health Plans: Alfred Walker, D.D.S., Chairman, New York, N. Y.; Charles A. Wilkie, D.D.S., Brooklyn, N. Y.; Michael M. Davis, Ph.D., New York, N. Y.; Harry Strusser, D.D.S., New York, N. Y.

This outline is published at the request of the Committee on Community Dental Service for information, and because it is believed to be important that public health officials and others interested in the problems of community health should understand the dentist's point of view.

is taken of the basic relation of dental care to the health needs of the country, and the responsibility of the profession thereto. The profession should first call the attention of government officials, public health authorities, welfare workers, etc., to the fact that both treatment and replacement of diseased teeth must be done entirely by the dentist; that this treatment or replacement must be done in an office having complicated and extensive equipment and instrumentarium; that because of the unique nature of dental disease a program for its control can only be devised by those having dental training.

The statement of its National Health Program Committee as published in the *Journal of the American Dental Association* for September, 1939, summarizes previous actions of the American Dental Association in this field and proposes a mechanism for the participation of the profession in a national health program. Its recommendations cover the setting up of a federal dental council and state dental councils; also recommendations for a dental health education program and a dental care program. The fundamental pronouncements in this statement are excellent. What is needed now is further particularizing as to the carrying out of the proposed program. As stated in the committee report: "The plan shall give careful consideration to: first, the needs of the people; second, the obligation to the taxpayer; third, the service to be rendered, and fourth, the interests of the profession." With regard to all those points the American Dental Association must continue to assert its legitimate leadership, and must maintain control of the situation.

The American Dental Association has taken progressive action at its last two meetings and has made definite proposals. It is highly important, therefore, that a specific plan be formulated and adopted if the situation is to remain in the hands of the dental profession. The urgency of such action is further accentuated by the following factors:

1. Expansion of government health activities and subsidies as now carried on through the Social Security and other recent acts of Congress.
2. Tendency of private welfare agencies, recognizing the need and demand of dental service, to enroll dentists in a subsidized service.
3. Profit seeking agencies, becoming alert to the demand for dental service, are seeking to enter the practice of dentistry by organizing various financing schemes.
4. Contract practice without the supervision and guidance of organized dentistry is spreading rapidly.
5. Local government authorities are undertaking to provide community dental care without ascertaining and conforming to policies and standards adopted by organized dentistry.

Frequent contemporary reference to unsatisfactory health plans in various foreign countries appear in the dental press, with implications that American dentistry is facing a similar unfortunate situation under government control. *This is a fallacy,* because the countries referred to differ socially, economically, politically, and professionally from the United States. There is no need for us to follow their patterns or to make the same mistakes. Comparisons with other systems cannot be drawn, although we may benefit by the experiences of other countries. Careful survey of the situation here indicates that a truly American plan can be developed.

Private practice, as we know it, may and will continue even with the adoption of a plan which simply recognizes dental needs in the population and the scope of professional resources available today and which proposes dental care on an increasingly adequate scale for that part of the population which now receives emergency treatment only, or none at all.

General Principles

An adequate dental service must be based on the standards and policies of American dentistry, which are universally recognized as the highest in the world. This service must conform to the principles already adopted by the Board of Trustees of the American Dental Association; these principles provide for maintenance of quality of service, limitation of service to income-eligible groups, and provision of adequate rewards in compensation, prestige, and security for those who elect to enter the field.

The creation of a national dental health service is a new undertaking, hence any plan which is proposed will be subject to modification, according to experience. What is needed in view of this lack of experience in national dental health service is additional investigation to round out our present knowledge of dental conditions among adults in this country. Dental conditions among children are well known.

It is not possible at present to attempt to provide complete dental health service for all classes and ages of the population at one and the same time. Such a plan will evolve in time from the combined adult and children's plan proposed hereinafter. What is proposed is a realistic plan based on local experience in administering dental health service, and on available surveys of dental conditions and community economics. A start should be made toward classification of the adult population according to economic status and dental need.

The experience of the dental profession in its efforts to promote mouth health has been that dental care for children will be productive of the greatest ultimate good and the greatest ultimate economy. The children's program should be based on an extended public health education program. An intensive program of complete dental care for children should be carried on under the proposed plan.

Finally, the setting up of standards of service to be rendered must be in the hands of the dental profession, the only body competent to pass on such matters.

The Plan

The plan presented here sets up concrete proposals as to organization, salaries and types of service to be given, and selection of those to be served. It is submitted for the consideration of organized dentistry.

PEOPLE TO BE SERVED

It is intended to apply to such groups as will be given medical care under legislation. It will be understood that proper eligibility levels will be established with the coöperation of professional and social service groups, and admissions to the service properly administered so that there may be no encroachment on normal private practice.

CLASSIFICATION OF GROUPS TO BE SERVED

The population can be divided into the following three groups from the standpoint of ability to pay for dental service:

I. Those who cannot afford any dental care or can only pay for the barest emergency service

II. Those who can pay only part of the normal cost of dental care

III. Those who can pay normal cost for regular dental care

From a technical point of view the population may be classified as dentally favorable because of a basically sound dentition, or dentally unfavorable because of neglect, the presence of extensive oral disease, severe malocclusion, etc.

In formulating a plan which envisages provision of some dental care

In the large cities where clinics are set up there should be separate clinics for children and for adults because of the differences in the programs to be carried on.

ORGANIZATION AND ADMINISTRATION

Dental service should be organized by states with the coöperation of the American Dental Association, the state dental societies and component societies, in accordance with the provisions adopted by the House of Delegates known as the National Health Program.

DENTAL COMMITTEES

In each state that elects to set up dental service under the plan there should be:

1. A dental council as provided in the American Dental Association program; this would be a technical body and would have full control of matters pertaining to qualifications of dental personnel, quality of service, and supervision of service. It would be appointed from nominees presented by the state dental society.

2. A joint administrative board, non-political in character; the board should be composed of dentists, health officials or laymen, with a lay chairman, the representation of dentists being equal to that of other groups. This board would determine the extent of services to be rendered, control all financial arrangements, set eligibility levels for Groups I and II, etc., and would also act as a grievance committee. Its dental members would be appointed from nominees presented by the state dental society.

DENTAL PERSONNEL

Each state should have a chief or director of the program, who will be a dentist, and supervising dentists; these dentists would be full-time officials chosen under civil service. Where full-time service is to be set up the following grades of dentists also would be established—senior dentist, junior dentist, and intern or extern dentist; these dentists, except intern or extern dentists, would be selected under civil service.

Dentists who serve part-time in health department or board of education dental clinics should be chosen by civil service.

Dentists who elect to receive patients under this plan in their private offices shall satisfy the Dental Council as to their qualifications. In offices where the dentist has an associate, qualifications for the associate will be set up in such manner as to assure the quality of the service given.

Dentists participating in the plan in their private offices will be subject to periodic inspection of office equipment and to supervision through periodic examination of patients served. These dentists will be graded annually as to quality and quantity of service rendered. They will be subject to removal from the list for unsatisfactory service by action of the dental council subject to hearing by the joint administrative board. Supervision of this service in private offices would be in the hands of supervisors selected on a basis of competence and experience as provided for hereinafter.

THE PART-PAY PATIENT (GROUP II)

The dentist should not be asked to give adequate dental care to this group for less than cost, as he is so often asked to do today. The community should assume a fair proportion of the expense of the dental care of the part-pay patient, just as it assumes a share of hospital expense for those unable to pay in full.

REFERRAL OF CASES

Choice of dentist would be free from among those selected to participate in

such service by qualifying with the dental council.

An agency would be set up in each community under the general direction of the state authority to receive applications for free or part-pay service; the set-up of this agency might vary with local conditions. The agency would investigate the financial status of the applicant and make recommendations. The agency would probably be attached to the department of health or welfare. In addition to investigation of applicants it would handle such matters as payment to dentist and collection of part payment from the patient, if this plan is put into operation. Arrangements for deferred payments for this part-pay group might also be entered into by the agency.

APPENDIX

The foregoing plan has been approved in principle by the Board of Directors of the New York Tuberculosis and Health Association. The appendix, containing a proposed scalè of compensation for dentists, if and when the plan is put into effect, and estimated costs under the plan, was not submitted to the Board for consideration but was approved by the Committee on Community Dental Service and by responsible dentists whose advice was sought. The estimates of cost were based in part on a recent unpublished survey.

COMPENSATION

PART-TIME SERVICE IN PRIVATE OFFICE

Compensation may be given on an hourly basis with minimum standard of amount of service or on a unit or a per capita basis according to local condition. Variations in rate will depend on the size of the community and corresponding overhead costs. The range of compensation should be from $3.50 per hour in small towns to $5.00 in cities which have no clinic facilities. If service is on a unit basis or an annual per capita basis, compensation will be figured to give, as nearly as possible, a comparable return.

ELIGIBILITY AND SALARY LEVELS OF DENTISTS ON FULL-TIME SERVICE

Full-time service will be considered as consisting of 1,500 hours per annum.

SALARIES

Intern or extern dentist: salary of $1,500 per annum for recent graduates of approved dental colleges. The graduate may enter the service upon recommendation of his faculty, based on such rules as may be laid down and in compliance with state board regulations, without further examination. He will be considered an intern or extern and is only to be assigned to hospitals or larger clinics in which adequate supervision and postgraduate instruction are provided.

The intern (or extern) dentist on passing a suitable examination at the end of the year will be advanced to junior dentist with a salary of $3,000.* Intern (or extern) dentist status may not be retained more than one year.

Junior dentists, starting at $3,000, to receive a yearly increment of $200 until the salary reaches $4,000. They may either remain in the service at that figure or take the examination for "senior dentist."

Senior dentists start at $4,300 with an automatic yearly increment of $250 until the salary reaches $5,300. They may then take an examination for "supervising dentist."

Supervising dentists start at $5,500, with increment of $300 at the end of the first, second, and third years, until it reaches the figure of $6,400. Promotion to supervising dentist will depend on vacancies in that grade. Supervising dentists after 3 years may take an examination for state director or chief.

The state director or chief is to re-

* Salary figures would be subject to some modification according to the economic conditions of the various states.

TABLE 1

	Fillings	*Extractions*	*Operative Visits*	*Prosthetic Visits*
The 2 denture group (partial or full) required	1.2	2.9	3.8	5.3
The 1 denture group (partial or full) required	3.2	1.8	5.3	5.0
The no denture group required	9.2	0.7	10.6	...

ceive a salary commensurate with salaries paid to state officers of corresponding rank.

Dentists who have had 1 to 5 years' experience in private practice may qualify for service upon passing an examination. Dentists who have not had previous training in the service will not enter the service on even terms as regards their years in the profession with those who had previously entered. Salaries would start at $3,000 for those dentists who have been 2 years in practice and who pass the examination. However, at the beginning of the program, vacancies in all grades may be filled by competitive open examination in addition to promotion examination; thereafter all vacancies must be filled by competitive examination in accordance with rules specified above.

COST OF SERVICE

The costs of dental service as estimated below are based on experience in providing dental service in a metropolitan area; the figures are subject to modification according to local conditions.

CHILDREN'S SERVICE

It has been quite reliably determined that children's service would cost about $10.00 annually except as this is reduced through correction of accumulated defects, research, and health education. This figure would be expected to cover these activities during the early years of the service.

ADULT SERVICE

It is more difficult to estimate the cost of adult service under this plan. The need of the adult can be approximately estimated on the basis of several surveys. In a recent article on dental service in WPA dental clinics in New York City,[2] Strusser gives figures as to operations needed and number of visits required for each of several groups (see Table 1).

It is probably safe to figure that $10.00 a year per eligible adult will give necessary health service of adequate type (new and upkeep), it being expected that the heavy costs of initiating service because of the load of neglected mouths coming under care can be spread over several years (probably not all eligible people will apply in the first year).

If annual expense must be reduced below $10.00 per year, service must be reduced to extractions, with full dentures made when needed. This would probably reduce the cost to about $5.00 a year for adults.

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NOTE: The committee wishes to acknowledge assistance given in the formulation of this plan by J. A. Salzmann, D.D.S.

Public Health Engineering Phases of Murine Typhus Control*

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IN the light of our present-day knowledge of murine typhus fever—a disease primarily of rats and secondarily of man—control measures are aimed, directly or indirectly, toward rat destruction. Murine typhus fever, as it occurs in Southeastern United States and particularly in Georgia, is comparatively new, and its recognition as a communicable disease subject to control by engineering practices is recent. As a matter of fact, suspicion of the rat as a possible reservoir of murine typhus fever dates back only about 13 years.

It is the purpose of the writer to confine this paper, in so far as is practicable, to a discussion of the public health engineering phases of the control of this disease. No attempt is made here to outline a standard procedure for typhus control or to suggest that the methods currently employed by the Typhus Control Unit of Georgia may be equally applicable in other states. Rather, it is hoped that this discussion of the Typhus Control Program in Georgia may prove of some value to public health engineers who are or will be assigned to a similar problem.

ORGANIZATION OF TYPHUS CONTROL UNIT

Due to the rapid increase of typhus fever in Georgia, from 51 cases and 1 death reported in 1929, to 1,092 cases and 54 deaths reported in 1937, the Georgia Department of Public Health established a Typhus Control Unit within the Division of Sanitary Engineering in 1937. The purpose of this unit was to formulate plans for a state-wide program of controlling this disease, whereby advisory assistance could be rendered to county and municipal governments, as well as to organize local control programs. This state-wide unit, headed by a public health engineer, includes an assistant engineer and a clerk. In February, 1938, the Division of Epidemiology assigned an assistant epidemiologist to work in coöperation with the Typhus Control Unit, making investigations of reported cases in certain counties of the state.

THE TYPHUS PROBLEM IN GEORGIA

During 2 years' operation of the Typhus Control Unit, in coöperation with the Division of Epidemiology, studies have been made from field investigations, examinations of morbidity and mortality reports, and spot maps showing the distribution of the disease throughout the state. These studies have brought out certain general fac-

* Read before the Southern Branch American Public Health Association at its Eighth Annual Meeting in Memphis, Tenn., November 21, 1939.

tors important in organizing an effective control program in Georgia. The most important are the following:

1. Spot maps indicate that the disease was originally introduced through seaport towns and spread inland by means of main lines of communication. We find that about 93 per cent of the reported cases during 1937 occurred in the southern half of the state, the greatest incidence being in about 25 counties of Southwest Georgia.

2. Special studies by the Division of Epidemiology have indicated that the disease is principally an urban one, although there are some few counties in which the disease has been reported throughout the farming area.

3. Most of the urban cases have been traced to individuals employed in, or closely associated with food handling establishments, such as restaurants, grocery stores, markets, warehouses, etc. In many instances more than one case has been traced to a single business establishment. In these places a high rat infestation is usually found, due no doubt to the abundance of available food supply and harborage.

4. Although the disease occurs throughout the year, the greatest number of cases is reported during July, August, and September, with the lowest number during February and March. This variation may be correlated with the high rat flea index during the warmer months and the low rat flea index during the colder months.

5. The Norway or brown rat, *Rattus norvegicus*, the predominant species found in this state, is probably the principal reservoir of typhus infection. Other species of rats encountered are the *Rattus rattus rattus* or black rat, and the *Rattus rattus alexandrinus* or roof rat. In addition, in Southwest Georgia there has been found a black rat with all the characteristics of the Norway rat except color; also specimens of what is apparently a cross between a white rat and a black Norway rat, which has all the characteristics of the Norway with the exception of the coloring. A cross between black and brown of the Norway species has been noted.

6. The Norway rat is generally found in large numbers in those areas where typhus is prevalent. Studies made in 1934 by the Division of Epidemiology in two large cities of the state in which typhus was prevalent revealed that more than 90 per cent of the rats trapped there were of the Norway species; whereas in a coastal city in which typhus apparently did not exist, only about 43 per cent of the rats trapped were Norways, the remaining 57 per cent being *Rattus rattus rattus* and *Rattus rattus alexandrinus*. It has been observed in general that where there is a large Norway rat population, there is a correspondingly low population of the other two species, thus making it apparent that the *Rattus rattus rattus* and *Rattus rattus alexandrinus* flee before the invasion of the vicious Norway.

7. The two most common species of rat fleas found in Georgia are the *Xenopsylla cheopis* and the *Nosopsyllus fasciatus*, both of which are commonly known to be carriers of the virus of typhus fever. Flea indices from rats trapped in the business districts of towns are higher than those from rats taken at residences.

THE CONTROL PROGRAM

The control program was planned and organized with these factors in mind; and control measures, based on educational work sponsored by the state and local health authorities, are conducted on a voluntary plan of local participation. In other words, the State Typhus Control Unit serves in an advisory capacity in making preliminary investigations of the local problems, recommending control measures, and training local personnel in counties and towns. Costs of local supervisory services and all labor and material are defrayed by municipal governmental agencies or by individuals.

It has been our experience that the interest in typhus control in towns or counties is usually created through one of two ways. Frequently, this comes about as a result of a local outbreak of typhus fever involving some of the leading citizens, or through the statewide educational program sponsored by the Typhus Control Unit of the State Health Department. Too often, however, the interest among citizens is created by the former case. It is also true that interest in rat control is sometimes brought about strictly through the economic benefits that may be derived. As a result of this interest, a request for assistance from local governmental agencies or county health departments is usually transmitted through the

medium of official correspondence to the State Health Department which in turn is referred to the Typhus Control Unit.

PRELIMINARY INVESTIGATIONS

Before any control work is actually inaugurated, certain investigations are essential in order that the proper control measures may be applied to give the most effective results. These are epidemiological and engineering in character.

Epidemiological investigations precede the engineering investigations and indicate the possible foci of the disease on spot maps.

Engineering investigations of the indicated foci partly substantiate epidemiological investigations. Engineering investigations are directed toward the determination of the prevalence by species of rats encountered; types of buildings and amount of harborage; and garbage conditions and harborage on premises. The nature of the businesses, such as grocery stores, drugstores, hardware stores, warehouses, etc., located in the foci must be considered.

Determination of the economic status of individuals and of the town as a whole must be ascertained because of its importance with relation to the type of program that may be recommended.

REPORTS AND RECOMMENDATIONS

Reports based on the findings of the preliminary investigations are submitted to the responsible authorities, the purpose being to describe the extent and nature of the typhus problem in relation to the existing rat infestation, and to outline the methods of its control. These reports include cost estimates covering the recommended control measures. They are important in that they convey to the responsible authorities the fact that serious study has been given to their problem and that the points where control measures should be inaugurated have been located.

The general control measures recommended, based on the findings of the investigations, include one or more of the following: rat extermination, garbage control and clean-up, and rat proofing. These three control measures, either singly or together, have been employed in Georgia with considerable success since the establishment of the Typhus Control Unit.

CONTROL MEASURES

We consider an educational program of basic importance to the success of any typhus control program. The general educational program under the direction of the Typhus Control Unit is conducted on a state-wide basis through the following media: newspaper articles; lectures before school, civic and professional groups; pamphlets and bulletins; radio talks; demonstrations and exhibits.

More intensified local education is conducted along lines similar to the state-wide program. Meetings are held with special groups of citizens who are directly affected by the typhus problem. A plan of visual education is employed. Slides are shown to illustrate conditions favorable to rat life and the various control measures currently used. Handbills and leaflets on typhus are inserted in the water bills to arouse local interest.

EXTERMINATION

Rat extermination by means of poisoning and trapping can be relied upon only as a temporary means of typhus control. General rat extermination campaigns are spectacular only in producing remarkable results in the number of rats killed in a short period of time.

In Georgia, rat extermination by means of poison bait is confined chiefly to those areas determined by epidemiological investigations to be active foci. In such sections it is used to relieve

immediate emergencies created by outbreaks of typhus fever. These sections may consist of the entire business district of a small community or specific business blocks of a large city. To control typhus by this means, it must be repeated every two or three months or until permanent control measures are established. Its use other than in focal points is to reduce the rat population in existing buildings in which rat proofing has been partially installed.

There are a number of effective commercial poisons on the market. Only one—red squill—is extremely toxic to rats, yet harmless to human beings and pet animals. For this reason, it is the only poison used in the Typhus Control Program in Georgia at the present time.

In order that the bait will be properly placed, the workmen in charge of distributing bait are trained by the typhus control engineers prior to the actual start of the program.

The mixture of this bait depends entirely upon the toxicity of the squill used. Red squill with a toxicity of 3 to 4 grains per pound of rat is mixed in the following proportions: 1 part of squill, 3 parts of cornmeal, and 12 parts of meat or fish. The mentioned ratio refers to weight. It is advisable to distribute two kinds of bait and we have found that meat and fish are the most desirable.

Bait prepared in the form of torpedoes renders the most effective results. Torpedoes are made by placing about ½ teaspoonful of bait (which weighs about ½ oz.) in paper napkins and twisting the ends. Colored napkins are used to differentiate between the kinds of bait used. The effectiveness of torpedoes lies in the fact that they are small enough to be carried into rat harborages, resulting perhaps in the destruction of an entire nest.

During the past 2 years the Typhus Control Unit in Georgia has supervised 23 rat extermination campaigns with distribution of approximately 14,470 lbs. of bait, employing red squill as the killing agent. On this basis we have determined certain information to be used in estimating the cost of campaigns. For a town with a population of less than 10,000, the amount of prepared bait required, based on the total population of the town, is 0.05 lb. per person for the business district; while for city-wide extermination, the amount of bait needed is 0.25 lb. per person. For one business house an average of 1.75 lbs. is used and for a residence an average of 0.75 lb. is usually sufficient. Approximately 0.5 lb. per person is required for farming areas, or about 2.5 lbs. for each farmhouse. These figures are estimates only, yet they are found to be accurate enough for estimating campaigns in our state. The bait actually used depends, in the last analysis, upon the amount of rat infestation, type of building, and the thoroughness of the workmen in distributing the bait.

Usually ½ man-hour is required for mixing and distributing 1 lb. of bait in either business district or city-wide programs.

Estimates for large cities must be determined by existing conditions in the areas that are to be treated.

Trapping is a very expensive control measure consuming a large amount of time in proportion to the results obtained, as compared with poisoning. It does, however, have an important place in typhus control in regard to rat and ecto-parasite surveys. Trapping is employed as a means of reducing the rat population in existing buildings to which partial rat proofing has been applied. The two principal traps used are the steel trap which requires no bait, and the wooden or guillotine trap which requires bait. It has been our experience that best results are obtained from the former.

Poisonous gases as a means of fumigation of buildings are not used by the

typhus control engineers. Fumigation should be under the direct supervision of experienced workmen in order not to jeopardize human lives.

GARBAGE CONTROL AND CLEAN-UP

Generally speaking, garbage control and clean-up of premises is not considered directly as an important hygienic problem. However, when applied to typhus control this problem is of major importance.

Exposed garbage consisting of vegetable substances and house and kitchen offal often serves as the bulk of the rats' food supply. To remedy this condition garbage containers are not only necessary on all premises, but they should be used at all times. These recommended containers should be water-tight and constructed of heavy galvanized metal. A tight fitting top, easy for the user to remove, should be kept on the container at all times. The container or containers should be of sufficient volume to hold or protect the garbage accumulated between collections. They should be installed in such a manner that they cannot be overturned by dogs or other animals.

Clean-up of premises as applied to this program is the removal or proper storage of old lumber, boxes, rubbish heaps, trunks, piles of brick, etc., that offer the possibility of hiding and nesting places for rats. It also refers to low wooden floors and other enclosed spaces that are found in garages, chicken coops, and other outbuildings.

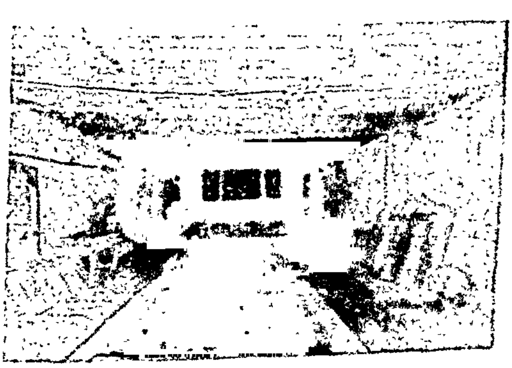


FIGURE 1—Rat proofing of cellar. Low wooden floor removed. Abandoned store fixtures in center and elevated above earth floor.

To promote the proper handling of garbage and the clean-up of premises, we have recommended garbage ordinances, municipal sanitary inspection services, and necessary improvements in the collection and disposal of garbage.

The proper control of these conditions results in the shifting and decrease of the rat population in a community. Incidentally, rat poisoning campaigns are more effective following a thorough garbage control and clean-up campaign.

RAT PROOFING

Rat proofing is essentially the separation of man and rat. It is only through rat proofing that permanent control of typhus fever may be accomplished. All other measures are considered temporary or secondary.

No attempt will be made here to outline in detail the principles involved in rat proof construction of buildings. This measure as the major part of the typhus control program in Georgia will be discussed principally in regard to existing buildings.

Existing buildings, which are the main source of rat infestation at the present time, are of more importance than new buildings in relation to the immediate control of typhus fever. Rat harborages are usually found beneath low wooden floors, between floors and ceilings, in double walls, in enclosed stairways, in various types of fixtures and equipment, and in mass storage of merchandise.

To encourage merchants to rat proof their buildings, we find that the corrections for each building must be presented in a practical manner. These recommendations are submitted to each individual in the form of a written survey which outlines in detail defects and corrections to be applied.

By utilizing this method of ap[illegible]

to the individual merchant, approximately 250 rat proofing jobs have been completed. Although recommendations for the complete elimination or protection of all existing rat harborages have not been complied with in full, sufficient work has been done to render the buildings rat free, which is the prime purpose of the survey. It has been the general impression of the average merchant approached that rat proofing entails expensive outlay. So far in Georgia, however, the maximum cost for labor and material utilized in this work has been $100 per building. The minimum cost has been about $15, with the average approximately $25.

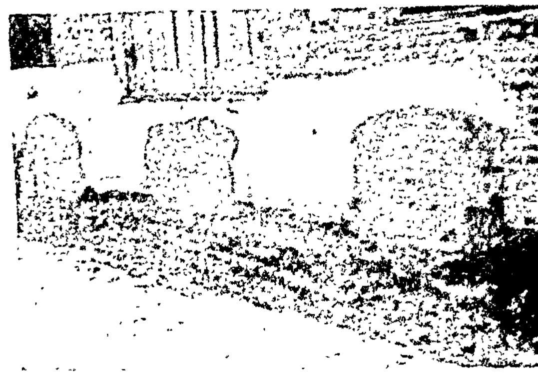


FIGURE 3—Vent stoppage. Former ventilator openings in exterior wall closed with brick, perforated galvanized metal and cement.

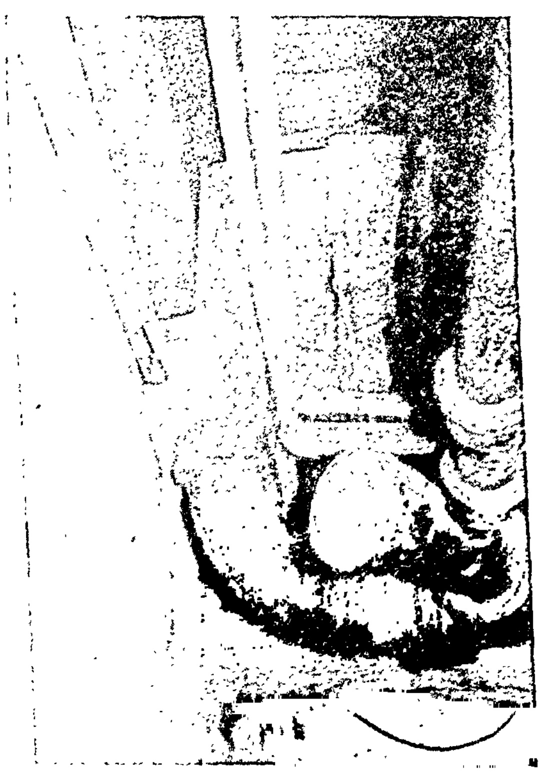


FIGURE 2—Rat proofing as applied to pipes. Galvanized metal installed around pipes to prevent rats from gaining entrance to upper floors.

The rat proofing discussed so far has applied only to individual business houses with the tenant or owner bearing all costs of the work.

Rat proofing of individual buildings is a long-term program requiring many years to show any appreciable reduction in the prevalence of typhus fever. In view of this, it has been necessary to find a method of control that would be city-wide in scope, relatively inexpensive, and effective as a typhus control measure. With this in mind, we have adopted a vent stoppage program.

Vent stoppage is basically a part of rat proofing. It may be defined as the closing of all openings in the exterior walls of buildings to prevent the ingress and egress of rats. As the name implies, it is the protection of all sidewalk and wall ventilators, using 16 gauge galvanized sheet metal plates perforated with ½" holes. It also includes the flashing of doors, especially rear doors, with 24 gauge galvanized sheet metal. In addition, other openings in exterior walls are closed with material that is impervious to rat gnawing. This program is financed by the municipalities

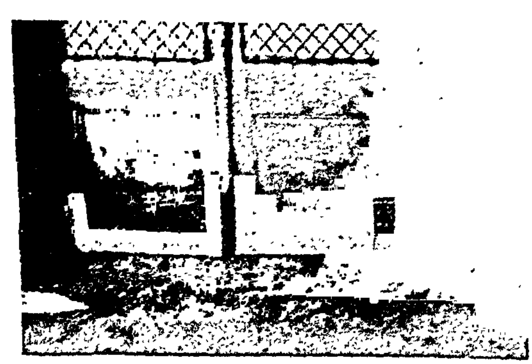
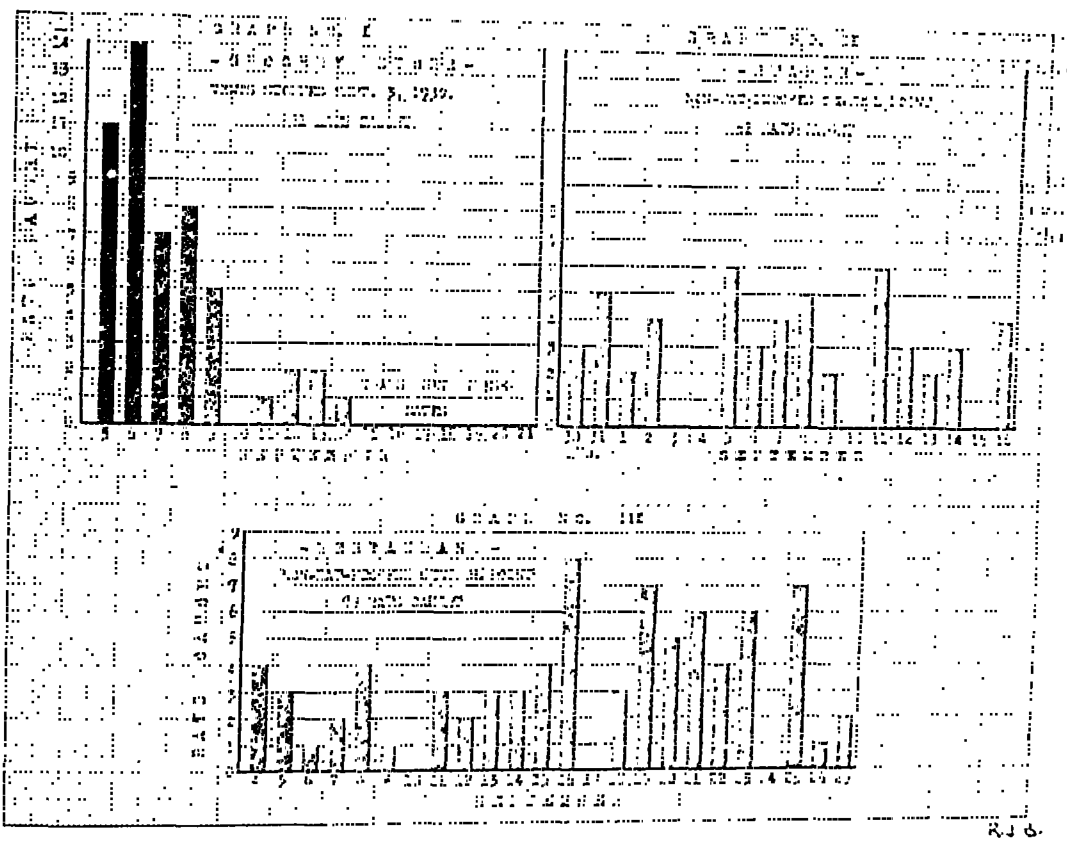


FIGURE 4—Vent stoppage. Rear door to business establishment protected with galvanized sheet metal.



rather than the individual merchants. To date, vent stoppage work has been completed in 2 municipalities, and at the present time it is in progress in 4 others. A total of 225 buildings have been protected in this manner. The average cost to the municipality has been less than $5 per business house.

Work of this nature has been in progress for only about 4 months in Georgia. Thus, it is too early to attempt at this time to place any definite evaluation on the program; however, a reduction in rat life has been observed in the business districts of the two communities in which this work has been completed. Graphs I, II, and III are submitted to show trapping results in control points of one municipality.

New buildings rat proofed since the establishment of the Typhus Control Unit have been accomplished through personal conferences with owners, architects and contractors. Rat proofing ordinances have been enacted in several municipalities as a result of the public interest created by the typhus control program.

SUMMARY AND CONCLUSION

Due to the increasing incidence and the nature of the problem of murine typhus fever in Georgia, a Typhus Control Unit, under the direction of a public health engineer, was established in 1937. As a result of preliminary studies of the state-wide problem, the control program adopted and currently employed consists of preliminary investigations and control measures employing the use of rat extermination, garbage control and clean-up, and rat proofing. Only the essential features and the value of each control measure have been attempted in this discussion.

From our experience with this disease, we conclude that:

1. The control of murine typhus fever is basically a public health engineering problem.
2. Epidemiological and engineering investi-

gations are necessary for the success of the control program.

3. A well organized educational program is indispensable.

4. The use of toxic red squill bait in the form of torpedoes is an effective means of temporarily reducing the rat population, and consequently, typhus fever when applied in areas predetermined to be foci of infection.

5. Garbage control and clean-up affords an effective means of reducing the rat population on premises through starvation and destruction of harborages.

6. Rat proofing is the only permanent means of rat control and murine typhus fever control.

Utilizing Vital Statistics in the Public Health Program*

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CIRCUMSTANCES which developed in Cincinnati a few years ago made it imperative that searching studies of health data be undertaken. These studies have been centered in vital statistics and the results have led to some new approaches in furthering this city's public health program.

Our special interest in vital statistics dates back nearly a decade when the outlook for progress in tax supported health circles was not a happy one. A short account of the background of this interest will not be out of place.

In 1930, and as far back as 1920, Cincinnati's official mortality rates were unfavorable when compared with those of most other American cities similar in size and population make-up. At the same time the city health department was under-budgeted and under-staffed. Repeated efforts on the part of official and voluntary health agencies for more adequate support of the health department had gone unheeded. Health agencies had repeatedly pointed to the city's high mortality rates and the shameful record of deaths from preventable causes as indicating the need for larger appropriations to the health department. The Finance Committee of City Council countered with the argument that the high death rates could be accounted for in the high per cent of Negroes, the large numbers of old persons making up the city's population, and in the many nonresident hospital cases that die here each year. The appropriating body would not be convinced that the health department personnel was insufficient to deal with the preventable disease problems. The health department repeatedly lost its case at budget hearings for any material increases mainly because factual data were not then available to disprove the arguments against such increases.

Those concerned in the plight of the health department agreed that this situation challenged a searching investigation of mortality records, of the activities and expenditures of the health department, and the gathering of such other data as were necessary to provide indisputable facts in support of reasonably adequate tax financed preventive health services for the city. The Health Department, Academy of Medicine, and Public Health Federation were directly concerned in gathering this information, the last organization being elected to make the investigations.

The mortality survey was divided into two parts: One dealt with a comparison of mortality experience in 13 American cities, including Cincinnati, all cities being of similar size and of

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* Read before the Vital Statistics Section of the American Public Health Association at the Sixty-eighth Annual Meeting in Pittsburgh, Pa., October 20, 1939.

similar population make-up, and the other with deaths of Cincinnati residents in relation to the city's 107 census tracts and 4 economic groups of these tracts. The records of 1929–1931 were studied and average death rates for this period determined on the federal census base of 1930. The results of these surveys, published in 1935,[1] were so significant that the Public Health Federation decided to extend the survey to allow comparison of mortality experience in the same 13 cities for the period 1934–1936 with that of 1929–1931 and to cover a 10 year period, ending in 1938 for the Cincinnati experience.

Results of the original investigation showed beyond doubt that Cincinnati's death rate was significantly above average after adjustments had been made for age distribution and non-resident deaths. Generally speaking, the local mortality record was found to be unfavorable for causes commonly recognized as preventable or partially preventable, but for other causes the local experience was in keeping with the average elsewhere.

A brief of these facts was presented to the city manager and city council in 1936. In the same year the Federation made an appraisal of the health department in accordance with American Public Health Association standards and compared local health department expenditures in 1935 for preventive health services with identical items officially reported for the same year from a number of United States cities of similar size. Heretofore city officials would not accept the figures usually published on per capita expenditures. Again Cincinnati had an unfavorable showing; her health service staff was below average in number and her per capita expenditure for preventive services was only slightly more than half the average for the other cities surveyed. These facts were also reported to the city authorities. To our best knowledge these figures have not been challenged. Finally, the Academy of Medicine and the Federation publicized the results of these investigations in a special campaign prior to fixing the city budgets for 1937.

In short, these efforts have at least turned the tide in the right direction. The health department has recently been receiving larger increases in budget and personnel, although the allotment is still quite inadequate. It is also worthy of note that the "city fathers" give evidence of an active interest in the further needs of the health department.

Cincinnati's unfavorable position in mortality from preventable diseases was another challenge which indicated that combative efforts should be especially waged against tuberculosis, the common acute contagious diseases, infantile diarrheas, and appendicitis. The health department was not equipped to conduct intensive campaigns on all these fronts. It was therefore agreed that the Academy of Medicine and Public Health Federation would aid in efforts to improve the preventable disease situation.

Each problem is continuing to receive special study centered in morbidity and mortality data. A number of campaigns have been conducted to arouse an active interest among citizens in reducing illness and deaths from these diseases. The Health Department and Anti-Tuberculosis League have conducted special surveys of tuberculosis contacts in a high death rate area from this disease. The Anti-Tuberculosis League has amplified its program of education and search for cases and contacts.

Demonstration studies have been jointly carried out by the Health Department and the Federation in order to learn more about the underlying factors involved in the spread of acute contagious diseases and infantile

diarrheas. Intensive studies of the latter problem were conducted during the summers of 1934 and 1935 with the assistance of field staffs of F.E.R.A. nurses. Census tracts were selected for survey in the area of highest death rates and practically every child under 5 years of age was under continuous observation during the periods of study. The results have been most helpful. We gathered data for the first time as to the incidence of infantile diarrheas in a large group of children, as to the identity of underlying factors and procedures which are effective in reducing mortality. The Academy of Medicine, Health Department, and Public Health Federation have joined hands in an effort to reduce appendicitis deaths, directing their campaign to physicians, druggists, and the public. All are participating in the campaign against syphilis. Further efforts are now being contemplated in control of such diseases as pneumonia and diabetes.

In all these efforts the publicity element has played a most important part. Worthy of mention are the scheduled health educational features which have been developed. For the past 5 years a daily 100 word health article has appeared in a local paper under the title "Save-a-Life." For 4 years original health posters have been distributed monthly to factories and other work places. Health messages originating locally have appeared every two months in street cars and buses serving the metropolitan area for the last two years. The health commissioner, Dr. Carl Wilzbach, has been giving a 15 minute health talk weekly over a powerful local radio station for the past 5 years. During the past year the Federation, in coöperation with the Board of Health and the Academy of Medicine, has been conducting a weekly series of radio dramas emphasizing the special efforts already referred to. The dramas have been presented by the workshop of the WPA.

These features are mentioned as examples of the far reaching effects of vital facts, direct or implied, when amplified into health educational material. These media have been very potent forces in furthering our campaign efforts and they are continuing as a valuable educational asset.

Vital statistics can be utilized to great advantage in health education programs provided they are presented so they will be readily understood by the public. The manner in which deKruif has popularized our mortality studies in his book *Why Keep Them Alive,*[2] illustrates how technical material can be made interesting to the public. We are lead to believe by our rather wide contact with the public that most lay persons are baffled by discussions in the parlance of the statistician. Even some physicians do not seem to grasp the meaning of death rates and are quite at sea when confronted with a long array of statistics. The average person when given only the cold facts is apt to regard them as dry and uninteresting because he is not trained to understand their significance. We have learned that if we want John Q. Public to get our message we must put it in his language, avoid the use of too many figures and make the message short and interesting.

In this connection we have found the counsel of publicity experts most valuable. It has been our good fortune to have these services gratuitously and no doubt others can avail themselves of such counsel on the same basis. The point here is that if we want to sell health facts to the public, these facts must be presented in such a fashion as to catch interest, make appeal, and create a desire to act.

In Cincinnati there seems to be an increasing tendency among agencies concerned in public welfare to gather and exchange statistical data. This has no doubt come about because most of us

realize that public organizations by and large are interdependent for a broad scope of factual information. The use of vital statistics by agencies other than those engaged in health activities works to advantage in two ways: it helps those who receive as well as those who give. Usually those who ask for these statistics want them to supplement or support data they have gathered in their own particular field of interest. To that end we have supplied data from our studies to the University of Cincinnati, the public schools, the local Housing Authority, departments of city administration, members of the local medical profession, and to health agencies in other localities. This service has proved helpful to others in many ways, from aiding students to prepare theses for university degrees to playing a part in locating the site for an $8,000,000 slum clearance project. The donors benefit in having a wide use made of their statistical material, in having this material brought to the attention of the public through other channels, and in realizing that their stock in trade is of practical value.

Now for some comments on the more technical side of our work in utilizing vital statistics:

The census tract population unit has proved to be most useful in our analyses of vital statistics. These small geographic areas with fixed boundaries enable a comparison of records in relation to time and locality. The federal census of 1930 provided a fund of information in addition to the usual population statistics, and the federal census of next year will probably afford even more supplemental data. The local investigations were made possible of extension to more recent years through a regional census taken in 1935.

When birth and death statistics are correlated with those bearing on social, economic, and environmental conditions pertaining to the same units of population, we gain new concepts of our health problems. It is of academic interest to know, for instance, that the enteritis death rate among infants in one census tract is twice as high as in another census tract. Such information becomes practical and usable when the circumstances which account for these differences are known. Often a first-hand knowledge of factors contributing to excess morbidity or mortality can be revealed only through special study, which becomes indispensable to a practical and intelligent understanding of how to attack the problem.

The census statistics on monthly rentals of dwelling units have been used extensively. In lieu of exact income data, they have been employed as indices of the economic status of our census tract population units. The procedures devised by Howard W. Green of Cleveland in computing these economic indices have been used with some variations to determine indices for Cincinnati. As used locally the economic indices represent median rental values for each census tract. The tracts are ranked in order of these rental values and then grouped to embrace tenths and fourths of the city's population. On the face of it, rent would appear to be a rather crude index of economic status, but mathematical testings have shown a surprising degree of reliability when fairly large units of the population are involved.

Our correlations of vital statistics material with economic indices have brought out findings which were more significant than from any other procedures used in this study. They have brought into relief two cycles in a living environment wherein one is seen at the lower extreme and the other, at the upper extreme, of the economic scale:

Low income, or dependency; bad housing and general unfavorable living environment; low level of education; grossly inadequate early medical care;

high incidence of preventable illness and mortality.

High income; favorable living environment; high level of education; reasonably adequate medical care; low incidence of preventable illness and mortality.

Going beyond the ordinary tabulations of births and deaths wherein procedures involve correlations with other data and detailed analyses is costly and time consuming. Some may raise the question—is this worth while? After 8 years of experience in studies involved as they have been in such details, we believe it is worth while. Our knowledge of local health problems has been considerably extended, we are in a position to plan health programs more intelligently and there is an increased public interest in and support of community health work. It has been encouraging that Dr. William Muhlberg, Medical Director of a large insurance company and president of the Board of Health, an outstanding student of vital statistics, has stated that these studies have proved of value to the Health Department. A few of our problems may become static but we expect that changes will occur with most of them. An efficient management of these problems subject to change will depend in no small part upon our frequently revised knowledge of the why, where, and how of these problems.

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DISCUSSION

RALPH CARR FLETCHER

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DR. ALLEN'S paper is divided into two parts. The first, and by far the longer section, is devoted to describing the methods of achieving a public health program in Cincinnati, and the important rôle that the use of vital statistics played in the campaign. This part of Dr. Allen's paper is a striking demonstration of a theory which I am sure we all hold that the success of a sound public health program is premised (1) upon a widespread interest and understanding on the part of the community of its health needs and the adequacy of its health services; and (2) upon the fact that the proper and continuous use of vital statistics is essential if such public coöperation is to be secured.

There is an important point to be raised in reference to the first part of the paper; that is, it should be emphasized that the achievements recorded were made possible by the willingness of the medical profession, as represented by the Academy of Medicine, the social and health agencies as represented by the Public Health Federation which in Cincinnati is a division of the Council of Social Agencies, and the public health officers as represented by the City Health Department. The willingness of these organizations, representing the important professional groups concerned with public health education, stands out as constituting a determining factor in the success of the Cincinnati program. Because such coöperation existed, it was possible to use vital statistics effectively in relaying to the public the importance

and the need of an adequate public health program, properly supported by the city.

I do not feel that such an observation minimizes the importance of vital statistics, but it too often happens that there are cities where there is a wealth of vital statistics and equipment to utilize them, but where there is a dearth of public health interest. In such cases, it will usually be found that there is an unseemly reluctance on the part of professional groups and civic organizations to recognize the need for coöperative promotion of public health education.

Dr. Allen's paper very effectively illustrates that when once the basic organizations and professions work together in tackling a common civic problem, it is relatively easy to elicit the support of schools, individual agencies, publicity experts, newspaper interest, and to make the community conscious, first of their needs, and second, of the most important fact in a democratic community, that the meeting of a community's need rests with the community.

The second part of the paper deals with some of the technical aspects in the use of vital statistics as employed by the Cincinnati Public Health Federation. Time does not permit going into all of the ramifications of the validity of the use of census tracts as a unit of measure of the differential mortality and morbidity upon a community basis. It has been my experience that the grouping of census tracts into study areas presents almost infinite possibilities and consequently almost infinite objections to any combination used. In a community such as Pittsburgh, because of our peculiar topography and historical background, one is more acutely aware of this problem than in cities such as St. Louis, Chicago, or Cleveland.

In spite of this problem, there is no question as to the effectiveness of computing mortality and morbidity rates by communities in eliciting public interest and support. Nothing is more effective in convincing the average citizen of his personal relationship to community public health than to show him the death and morbidity rates of his immediate neighborhood and to enable him to compare those rates with other communities. The validity of some of the statistical niceties employed in such research may be relatively unimportant when considered in this light.

This does not absolve us from the task of continuing to explore the theoretical aspects of these methods. Organizations such as the Cincinnati Health Federation, the Bureau of Social Research, the universities, etc., have an obligation to continue research on the technics of employing census tracts as a means of studying the community aspects of social and health problems.

A Typhoid Fever Epidemic Caused by Carrier "Bootlegging" Oysters*

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THE outbreak of typhoid fever discussed has several interesting and distinctive features: (1) the definition with which the trouble was traced to a specific carrier, a feature not found in previous oyster-borne epidemics; (2) high attack rate; and (3) comparatively short incubation period of most of the cases. The two latter features indicate rather massive infection.

Another feature quite distinctive, in view of the lack of sanitation which prevailed, is the efficacy of the control measures instituted by the state and parish health authorities as shown in the comparatively few secondary cases.

The oysters involved were of local rather than interstate importance as none, so far as could be learned, were distributed beyond the local communities to be discussed.

COMMUNITIES INVOLVED

The locale of the trouble may be described as limited sections of Jefferson, Lafourche, and St. Charles Parishes in the southeastern part of Louisiana, with its center at Bayou Gauche in St. Charles Parish about 40 miles southwest of New Orleans. These sections are inhabited largely by people of French descent who depend for their livelihood chiefly on muskrat trapping in the surrounding marshes. The inability of most of these persons to speak or understand English made the solicitation of case histories unusually difficult.

At Bayou Gauche, a community of about 200 persons living in from 1 to 4 room frame dwellings which include numerous houseboats along the bayou for a distance of two miles, environmental sanitation was extremely poor in the majority of families. The water supply was derived from poorly constructed and poorly maintained individual household cisterns storing rain water. Excreta disposal was chiefly by insanitary privies or none at all, and into the bayou in the case of houseboats, in which the washing of utensils and clothing as well as bathing was not unusual.

Somewhat similar conditions existed at the trapping areas known as Bayou Perot and Bayou Rigolettes, although these houseboats and camps were not so concentrated as at Bayou Gauche. Between 150 and 200 persons were camped in and around these two bayous during the trapping season which closed on February 5.

Despite poor sanitation there had been no cases of typhoid fever reported from the Bayou Gauche community during the past 5 years, nor is there

* Read before the Engineering Section of the American Public Health Association at the Sixty-eighth Annual Meeting in Pittsburgh, Pa., October 17, 1939.

record of cases originating in the Bayou Perot or Bayou Rigolettes section of Jefferson Parish during that time.

Lafourche Parish is concerned in this outbreak only to the extent that most of those believed to have become infected at the trapping grounds returned to their permanent homes in this parish at the close of the season just a day or two prior to the onset of illness. These homes along both sides of Bayou Lafourche from Golden Meadows to Lockport, a distance of about 25 miles, are much more favorably situated with respect to sanitation than those previously discussed.

EXTENT OF EPIDEMIC

The first report of suspected typhoid fever came to the attention of the St. Charles Parish Health Unit on February 13, 1939, when local physicians reported fever of undetermined origin in a group of about 30 persons at the Bayou Gauche community. The parish health unit started an investigation immediately and on February 18 was joined by the Director of the Bureau of Parish Health Administration of the State Health Department and the District Engineer of the U. S. Public Health Service. Up to March 14, when the outbreak may be said to have terminated, 63 primary and 5 secondary or contact cases were found at or in the vicinity of this community. Later investigation revealed 24 primary and 2 secondary cases among residents of Lafourche Parish, bringing the total cases to 94 with 8 deaths. Quite a few cases among residents of Jefferson Parish, trapping in the marshes around Bayou Perot and Bayou Rigolettes, can be assumed to have been involved in this outbreak. However, as the parish does not have the advantage of a full-time health unit, competent epidemiological investigation was not conducted in that parish.

TABLE 1

Diagnosis of Initial Cases

Groups	Clinical Symptoms Each Patient Exhibited Two or More of Classical Symptoms, i.e., Fever, Chill, Headache, Rose Spots, Bradycardia, Dicrotic Pulse, Diarrhea, Nose Bleed	Positive Laboratory Diagnosis			Autopsy Confirming Diagnosis	Number Clinically Diagnosed Not Confirmed by Laboratory Diagnosis	Number of Deaths
		Blood Culture	Feces	Widal			
Group I Home diagnosis and treatment	36	7	18	12		9	1
Group II Diagnosis at home; later hospitalized for treatment	20	8	2	15	2 (both showing typical gross and microscopic findings of typhoid fever)	4	3
Group III Hospitalized for diagnosis and treatment	31	17		11		7	4
Total	87	32	20	38	2	20	8

DIAGNOSIS OF CASES

The diagnosis of cases discussed will include 87 initial cases, divisible into 3 groups: 36 diagnosed and treated at home, 20 diagnosed at home but later removed to hospital for treatment, and 31 taken to hospital for diagnosis and treatment.

Clinically, the patients were for the most part typical cases of typhoid fever. The disease was characterized by an onset with general malaise and headache, fever which gradually rose to a high plateau, 104 to 105° F., and febrile period of 3 to 4 weeks. Table 1 shows the method of diagnosis, each patient being accepted as clinical diagnosis who exhibited two or more of the cardinal symptoms of typhoid fever, namely, nosebleed, hyperpyrexia, rose spots, diarrhea, chills, bradycardia, and dicrotic pulse. Of these the more constant symptoms were nosebleed at onset, hyperpyrexia, diarrhea, and bradycardia. Many exhibited every clinical symptom of typhoid. Diagnosis was confirmed by laboratory examination in 27 of the 36 cases in Group 1, 16 of the 20 in Group 2, and 24 of the 31 in Group 3.

Positive laboratory diagnosis was obtained in 67 cases, including all 3 groups. Positive blood cultures were obtained on 32, positive feces cultures on 20, and positive Widal agglutinations on 38 cases. From this it may be seen that the high number of positive reports is accounted for in that some cases had all positive reports, i.e., blood cultures, feces, and Widal.

These results, positive classical symptoms of typhoid fever, positive laboratory findings, and positive autopsy reports on two patients dying in the hospital, proved that the patients involved were cases of typhoid fever.

COURSE OF DISEASE

The general course of the disease was typical, there being in most cases a febrile period of 3 to 4 weeks followed by a long convalescence. Of the total 94 cases, 53 were hospitalized and 41 remained in their homes for treatment. A list of complications and their frequency may be seen in Table 2.

TABLE 2

Complications During Course of Illness

	Total No. Involved	Per cent	Recovered	Expired	Remarks
Hemorrhage	12	12.55	9	3	
Pneumonia (Terminal lobar)	1	1.06	0	1	
Otitis Media	1	1.06	1	0	
Perforation	1	1.06	0	1	
Others (Appendicitis Thrombophlebitis)	2	2.12	1	1	One patient developed acute appendicitis while confined to Hospital
Total	17	17.85	11	6	

From this tabulation several facts are outstanding: (1) complications were relatively infrequent, occurring in only 17 of the 94 cases; (2) by far the most frequent complication was hemorrhage which occurred in 12 cases *; (3) per-

* Hemorrhage, according to Miller,[3] is usually the most frequent complication and occurs in about 7 per cent of cases.

foration occurred in only 1, a percentage of 1.06. This is of interest due to the fact that it is accepted as one of the more common complications of typhoid fever, having a reported incidence of 1.5 to 6 per cent; a fair average being 3 per cent.[1]

Another interesting fact was the rather typical course of the disease. With few exceptions those giving a history of having eaten the suspected food developed typical typhoid fever. No cases of violent acute intestinal upset with vomiting and diarrhea lasting only a few hours or days were found.

The mortality rate was 8.5 per cent, there being 8 deaths. The average death rate for typhoid fever is given as approximately 10 per cent[1]; mortality in the colored race, also in infants and the aged being somewhat above the general average.

In Table 3 are the number of deaths by cause.

Although all factors: high attack rate (81 per cent), short incubation period (10.7 days), and the typical long drawn out illnesses, pointed to a grossly infected foodstuff, the number of complications and the death rate were relatively low. Relapses were infrequent.

TABLE 3

Deaths

Cause	*Number*	*Per cent of Deaths*	*Remarks*
Toxemia	2	25	
Hemorrhage	2	25	
Perforation	1	12.5	
Pneumonia	1	12.5	
Others	2	25	Deaths due to suicide and thrombophlebitis.
Total	8	100	

EPIDEMIOLOGICAL INVESTIGATION

In taking case histories the interpreter services rendered by the unit director in Lafourche Parish and the unit nurse in St. Charles Parish were valuable. Several salient facts were elicited:

1. Of the 94 cases, 58, or 61.7 per cent, occurred among the males and 36, or 38.3 per cent, among females, proportions which indicated no significant sex group attack as this ratio is quite consistent with that of the general population engaged in trapping, fishing, and some oil field exploration in the areas.

2. Nearly all ages were represented in proportion to the local population. The youngest patient was 3 and the oldest 74 years of age. Those under 5 made up 5.3 per cent, while 32 per cent were between 5 and 15 years, 51 per cent between 15 and 35 years, and 11.7 per cent over 35 years of age. This seemed to eliminate the significance of any particular age group. Living conditions and economic status were practically the same throughout the group.

No common milk supply was found. The patients consumed milk from the family cow or used canned milk. Practically all other foods were canned with the exception of fish and meats. No common souce of fresh vegetables or fruit was involved. Only one particular product appeared to be common to the majority of cases, shell oysters purchased from a peddler or vendor, operating an oyster lugger, who made only one trip during the season to the Bayou Gauche community. A few persons placed the date of this man's visit as February 1, while other were indefinite as to the date. However, its accuracy was definitely confirmed by relationship to well remembered community events, such as the death of one of the oldest residents which occurred on February 2, the day following this vendor's only visit to the community.

In some instances histories were

given of buying shell oysters from several other vendors coming in by boat or truck at almost weekly intervals throughout the season. However, the vendor in question was well known, related to several families, and was readily identified by those at Bayou Gauche.

During the investigation of patients having permanent homes in Lafourche Parish but infected while trapping, it was found that those camping in Bayou Perot purchased oysters on February 2 and those in Bayou Rigolettes on February 3 from this vendor.

In all instances this food product was purchased in the shell and opened by the individual buyers, indicating that infection undoubtedly reached the oysters in nature rather than by subsequent handling.

IDENTIFICATION OF CARRIER

The vendor, identified for the purpose of this discussion as X, was found to be an unlicensed oyster dealer residing at Westwego in Jefferson Parish just across the river from uptown New Orleans. He had not registered his boat with the State Conservation Commission, nor had he applied to the Louisiana State Health Department for permission to engage in the oyster business. Therefore, his operations were purely of "bootlegging" nature.

During an outbreak of typhoid fever in February and March, 1938, in the Westwego section, X, then a helper on an oyster boat, was under suspicion as a carrier due to his history of typhoid fever about 8 years previous. Laboratory examination of feces by the State Health Department on March 5, 1938, was reported as positive for *Eberthella typhosa*. Upon learning of this report, X claimed that the specimen was taken from the contents of the pit privy at his home and not directly from him. His daughter at the time was a typhoid fever patient at home. Subsequently, urine and fecal specimens taken on March 10, March 25, and July 7, 1938, were reported negative. No further attention evidently was devoted to X until the appearance of several typhoid cases at Westwego late in January, 1939. Some of these were associates or close neighbors of X.

Through arrangement with the U. S. Marine Hospital authorities at New Orleans, it was decided to locate X as soon as possible and place him in this hospital for a sufficient time to ascertain definitely his carrier status. On or about February 6 he was located at his home, and admitted to the Marine Hospital two days later.

HISTORY OF CARRIER

X, white, aged 42, was admitted to the U. S. Marine Hospital at New Orleans on February 8, 1939, as a suspected chronic carrier of typhoid fever. The family history with respect to typhoid fever showed that a daughter was a victim last year and that the patient had had typhoid fever 9 years prior to this admission. The family consisted of a wife and 8 children, the oldest 21 and the youngest 4. At the time the patient had typhoid fever neither his wife nor children were affected. One daughter had typhoid in 1938, and at the time this history was taken a son was in another hospital in New Orleans with typhoid fever.

On physical examination the patient was found to be well developed, well nourished, and not acutely ill. All physical findings were essentially negative.

Eberthella typhosa was isolated from the first stool examined on February 10, 1939. The bile obtained by gall-bladder drainage on February 12, 1939, contained the microörganism in pure culture. The urine was negative for *Eberthella typhosa*.

During the patient's stay in the hospital feces cultures remained positive from February 10 to April 2. Cultures

of the bile obtained on gall-bladder drainage were positive 4 times. Urine specimens were consistently negative. Sulfanilamide administered in sufficient doses to maintain a blood level of 10.8 mg. and 15.3 mg. per 100 cc. for 1 and 2 week intervals, respectively, failed to clear up the patient.

On April 17, 1939, cholecystectomy was performed. The gall-bladder showed subchronic cholecystitis, although the patient gave no history of symptoms of this condition. A pure culture of *Eberthella typhosa* was obtained from the bile in the gall-bladder.

Subsequent feces cultures were positive during May. The last positive report obtained was June 2. Five feces cultures made subsequently and until discharge were negative. The patient was discharged from the hospital July 26, 1939, with instructions as to the importance of not accepting any employment which would involve the handling of food, as well as the necessity of reporting at intervals for stool examinations. He has returned twice, the last time August 7, when feces cultures were negative. He is to remain under observation to determine whether the negative reports following cholecystectomy denote a remission of the carrier stage or actual cure. A cure in chronic carriers is said by some observers to be obtained in 60 to 70 per cent of cases following cholecystectomy.

DESCRIPTION OF CARRIER'S PRACTICES

As X remained at the hospital until July 26, 1939, there was ample opportunity to question him, at times through an interpreter, concerning his oyster operations. The area from which he secured this particular load of oysters is Bay Le Mer and Four Bayous in the southeastern section of Barataria Bay. These areas are remote from any of the usual or continuous sources of pollution. Their safety under usual conditions has not been questioned, but their product is referred to more or less as "wild" oysters, indicating that they are not used commercially. X, with his son, found it possible to tong only 4 or 5 sacks in a day, thus it requires 4 to 5 days to secure about 20 sacks.

The day's catch was taken by skiff close to shore and dumped in about 2 feet of water, until it amounted to a boat-load. This practice was chiefly for the purpose of keeping the oysters fresh by storage in water. X and his son would then row out to the larger boat anchored off shore in water sufficiently deep to meet the requirements of its draft—4 or 5 feet—and a few hundred feet from the storage area.

Two major possibilities existed as avenues of infection—defecation by the carrier over the natural growing area while tonging in the daytime, or between sunset and sunrise while anchored a short distance from the storage area. The latter possibility was much greater. Tidal and wind action with this concentration of shell stock in shallow water would favor this theory over that of such massive infection of the oysters while rather sparsely scattered over several acres of growing area in deeper water.

X, during former trips would head for Westwego by the most direct bayous and sell the oysters there to a trucker who operated over a route which included some small communities between Westwego and Baton Rouge. Inquiry along this route did not indicate significant prevalence of typhoid fever. However, on his last trip, probably due to the report having reached him that the town marshal of Westwego was searching for him, he took another route. Anticipating confiscation due to his being unlicensed, it is believed that he hoped to sell his catch wherever possible in isolated communities or camps in the trapping section. Therefore, his route took him entirely across Lake Salvador and up Bayou Des Allemands

to Bayou Gauche, about 15 or 20 miles, where on February 1 he sold many of his oysters. He returned to Bayou Perot on February 2 where he evidently sold to 6 or 8 camps and thence to Bayou Rigolettes where 5 or 6 other camps were his customers. In fact, he spent the night of February 3 at the camp of one of the fatal cases.

INCUBATION PERIOD

The incubation periods in this outbreak ranged from 3 to 27 days with average of 10.7 days (Figure 1). The case with onset within 3 days of exposure terminated fatally. Six of the 8 deaths show incubation periods of 3 to 9 days.

Due to the overwhelming evidence developed a survey was included of persons not ill in the affected communities who had eaten the suspected food product. The results, with some statistics resulting from the epidemiological study are shown in Table 4.

Including the two uncertain histories of 108 presumably non-immunes exposed, there resulted 87 cases—a rather high attack rate of 81 per cent.

FIGURE I

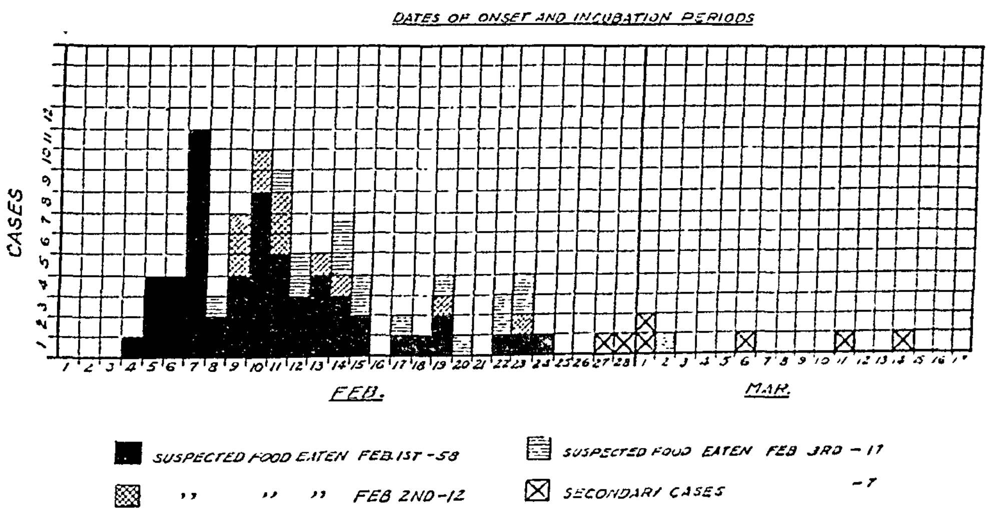

TABLE 4

Tabular Summary of Epidemiological Survey

Cases—Believed due to infected oysters	85	
" —Not certain as to eating suspected food	2	
" —Believed to be secondary	7	
" — Total		94
Deaths 8—Mortality 8.5%		
Well persons giving history of eating suspected food		29
Of these: Immunity unknown	21	
Inoculation within one year	2	
Previous typhoid	6	
Well persons giving history of eating suspected food after cooking		37
(Note: No illness reported among those eating suspected food after cooking)		
Well persons in household of cases giving no history of eating suspected food		35
Well persons uncertain as to eating suspected food		2
Persons in households reporting no cases and no history of eating suspected food		121
Total persons included in this survey		318

CONTROL OF EPIDEMIC

Control measures consisted of isolation of the patients, education of the people in contact with the patients as to sanitation and concurrent disinfecting, community sanitation as a whole, chlorination of all water supplies, and inoculation of all well people in the community with the 3 dose Triple Typhoid vaccine. In view of the unfavorable environmental conditions, the finding of only 7 contact or secondary cases indicates the efficiency of the control exercised over the primary cases.

Of importance was the search for carriers among the recovered patients. Each patient before discharge had two negative feces and urine cultures. This was followed 1 month later by repeated feces and urine cultures on 66 of the patients. No positive cultures were obtained. Although the methods available were exhausted, no chronic carriers were found. It has been stated that the only absolutely safe indication of the complete absence of *Eberthella typhosa* from the intestinal tract would be offered by two negative bile and two negative feces cultures.[2] For obvious reasons, gall-bladder drainage could not be carried out in these homes. In the search for chronic carriers none was found, whereas one would expect to find about 3 per cent.[3]

SUMMARY

An explosive outbreak of typhoid fever in small bayou communities with 87 initial cases, of which 67 were confirmed by laboratory diagnosis, is reported.

Investigation involving 326 persons including 94 patients and 232 well persons is discussed.

An average incubation period of 10.7 days was established among the 87 initial cases with 52.8 per cent below 10 days, 28.8 per cent between 10 and 15 days, and 18.4 per cent over 15 days.

A definite carrier believed responsible, with medical history, laboratory examinations, and treatment is discussed.

Resumé of control measures adopted is given. No chronic carriers were found among the patients involved.

The epidemic was attributed to oysters infected by a chronic carrier whose feces were strongly positive for *Eberthella typhosa.*

The theory of probable avenue of infection through carrier's commercial practices is discussed in detail.

ACKNOWLEDGMENT

We acknowledge with appreciation the excellent coöperation in the field work by Dr. R. W. Todd, Director of the Bureau of Parish Health Administration of the Louisiana State Department of Health, and Dr. H. S. Smith, Director of the Lafourche Parish Health Unit at Thibodeaux, La., as well as that of Passed Assistant Surgeon J. G. Pasternack, U. S. Public Health Service, Chief of Pathologic Service, U. S. Marine Hospital, New Orleans, La.

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The Health Educator on the Radio*

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ALTHOUGH a radio audience may number in the millions, it seldom includes more than 2 or 3 persons.

It is necessary for one man who has a message he expects to broadcast to realize that speaking into a microphone is not the same as speaking to an assemblage of persons in an auditorium.

In an auditorium a speaker may have fifty, or one hundred, or a thousand listeners. On the air he has only one or two listeners. Seldom more.

The radio audience definitely is a personal audience. Do you shout at visitors in your home? Do you raise your voice as though to fill an auditorium when you speak to a business contact across your desk? Of course, the answer is No. That one difference makes it possible for radio to be personal.

That difference indicates also that radio requires a technic unto itself. Do not come to the microphone thinking you will speak as though you were addressing the multitude. Come to the microphone with the thought that you have an intimate message to deliver to one, two, or three friends, who are enjoying a pleasant evening in your living room.

There is another factor that concerns the radio—the element of time. Arbitrarily our broadcasting day has been divided into quarter hours or multiples thereof. We who speak into the microphone must learn to abide by the time limits that are set for us, we must learn to include within psychological limits as much substantial information as it is possible for a listener to assimilate during the time at our disposal.

I mean that on occasion within a given time we may include *less* information so that the listener may have more. This is comparable to halving your printed copy to have more readers. If as the result of a welter of facts we leave a bewildered listener gratefully dialing for another station we have accomplished nothing. If we present a few facts interestingly and dramatically so that they stay with our listener we *have* accomplished something.

There is a thought in connection with preparation, a thought that some speakers apparently never have.

It is simply this: Know the words in your script before you get to the studio. It is necessary to rehearse even a speech before the microphone. All of us are different—no two voices are alike. Different makes and types of microphones have different characteristics. No two studios are alike. And studio quality within the same studio changes from hour to hour as temperature and humidity change, as equipment is moved about, and as persons enter or leave it.

So it is well always to arrive at a

* Read before the Public Health Education Section of the American Public Health Association at the Sixty-eighth Annual Meeting in Pittsburgh, Pa., October 18, 1939.

studio in sufficient time to give the engineer and production director time to arrange the microphone and discuss angle and distance so that the best possible performance may be recorded in the loud speaker.

Thus far we have discussed only the simple speech. This type of broadcast is at the same time the simplest and yet the most difficult to write. Nothing can be duller and more deadly than an uninteresting speech. On the other hand, we have had on occasion, discussions that were highly dramatic, delightfully interesting, therefore entertaining, and so held our attention.

Another item of concern is the opening announcement. Although the radio station may re-write the opening and closing announcements that you provide, the continuity writer is very happy to have the information that you may include in those announcements. We at WLW have found a more ready audience acceptance for the opening announcement which concerns itself with the thought involved in the talk rather than with setting up the authority of the speaker.

We avoid the use of the words " talk," " speaker," " speech," and use instead such phrases as " tell us about " and " discuss."

The less the announcer says and the sooner the speaker begins, the greater will be the audience.

Now, how will the speaker hold that audience?

Time is valuable, so dispense with trite unnecessary expressions.

How many times have we heard speakers open with the words, " Ladies and gentlemen on this most auspicious occasion it is indeed an honor and pleasure to address you. I appreciate very much the kind invitation of the Amalgamated Sons and Daughters to speak to you and I am very happy to be here."

Of course he is happy or he wouldn't be there! Of course he appreciates the invitation to speak or he would not have accepted it!

Then there is the speaker who begins his speech by telling you what he is going to tell you and does it with such scientific verbiage that even a doctor of medicine or a director of education by radio has sense enough to tune him out.

Straight talks on any subject must begin in a vital manner. The first sentence must state a pertinent fact; be an interest provoking question, or be the introduction to a vital illustration.

It is the rare radio talk that can be developed in a logical, one, two, three manner and at the same time create initial interest and sustain it.

You've got to smack them in the eyes right off the bat or they'll begin looking for Jack Benny, Bing Crosby, or Hotcha Benny Goodman.

Yes, that's your competition. Every time you go on the air you are in direct competition with the best entertainment the world of Marconi affords.

I have been up in the morning to listen to a speech by Hitler or Mussolini or the Pope and the same evening have gone to bed after hearing a news broadcast from London or Paris, or music from Berlin or Rome.

In your particular work the simple speech is not the only technic that may be employed to present information. There is the technic of the interview. And here may I warn the script writer against making the fellow who asks the questions a dumbbell.

Don't have him ask questions such as one I saw in a health interview wherein the learned doctor of medicine wanted the announcer to ask him whether or not castor oil were used as a cathartic.

Give the interviewer, even if he is an Education Director or an announcer, credit for knowing at least a little something. Even allow him on occasion to make some contribution on the general theme; then if you must, have the

technical authority verify what he said. Don't make it all questions on one side and all answers on the other.

Then there is the round table technic wherein three or more persons contribute information in a general discussion. Undoubtedly, there are in many of your files, case studies, a brief dramatization of which might bring out the point much more readily than would a simple narrative.

And while you're writing dialogue, remember that you and I, except on very formal occasions, do not speak in paragraphs, and frequently not even in complete sentences.

Keep this in mind, that natural dialogue is not a series of more or less lengthy monologues. Even in very polite society, we frequently interrupt each other. Test your copy for professional words not known to the layman—get expert advice. The radio audience will not tolerate mediocre efforts.

Now a word or two about organization in preparation for this series of broadcasts. Professional men, as I don't have to tell you, are always busy. Consequently, I suggest that you do not saddle one man with the responsibility for the entire preparation of a series of broadcasts. Rather, make this one man chairman of a committee so that one person can be responsible for a broadcast every three or four or five or six weeks, depending upon the size of your committee. Decide upon a theme for your series so that each broadcast will not present isolated items. Try to tie them together in such a way that one broadcast will cause the audience to want to tune in for the next one.

In the network centers such as New York, Chicago, Los Angeles, Cincinnati, and San Francisco, you will find the radio station departments of education very happy to coöperate and supply professional assistance by way of helping prepare script, casting, and production.

In smaller communities almost this entire job will be on the shoulders of your committee. Here then it will be possible to bring in the coöperation of other agencies. Certainly in your town there is a little theater group, a college dramatic society, or a high school dramatic group. All these groups are anxious to secure the practical experience which goes with broadcasting, and they will be of great help.

At this point while we are talking about casting let us not forget that on occasion the secretary of your association, the royal keeper of the door, or even the janitor, might do a better job on the air than the president or chairman of the radio committee when it comes to the simple speech.

Getting back to the drama, keep your plot simple, your cast small, and bear in mind while casting that the voices should be sufficiently different not to cause confusion when heard side by side.

In the smaller communities, radio stations may not have a large sound effects laboratory.

Don't let that worry you; a little ingenuity will overcome those difficulties. But here another warning. Don't allow your script writer to include too much sound, let the sound be suggestive rather than predominate. Also, on occasion, sound without explanatory dialogue is meaningless. If sound can be left out without detracting, don't use it. Strive for simplicity.

Another thing to be remembered is the time of day during which the broadcast appears. It goes without saying that certain subjects in a health broadcast might not be conducive to a good appetite if presented too close before meals, nor conducive to a well settled stomach if presented too soon after mealtime. If your broadcast period is too close to mealtime, of course, good taste will suggest that certain subjects be treated very gently.

Above all, don't let your radio char-

acters talk in paragraphs. We don't in real life.

Allow those last two words, real life, to be the theme of any radio appearance for which you are responsible. You in the field of public health deal with human beings.

Remember, when you go on the air you are dealing with human beings, and that these human beings are quick to discern that which is false or pretentious.

Keep your broadcast simple, natural, and true to life, and lo! the multitudes will call you blessed.

Educational Qualifications of Staff Members in Health Departments*

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KEEN interest, both public and official, in the competence, efficiency, and professional qualifications of public health employees has been in evidence for some time. One concrete expression of this interest is the statement of standards for various workers which has been set up by the Committee on Professional Education of this Association, and the adoption, by the State and Territorial Health Officers, of minimum qualifications for new personnel employed with grants-in-aid through the Social Security Act.

Another indication of this interest is the provision of funds for the training of public health workers through Titles V and VI of the Social Security Act.

Following the adoption of standards for the various types of personnel, and the commitment to training of workers, both the Committee on Professional Education and the Committee on Professional Qualifications and Training of the State and Territorial Health Officers felt the need for information on the present level of training and experience of existing personnel as a base line for further plans and programs. Accordingly, the Public Health Service was requested to survey the training and experience of full-time professional personnel in the official health departments of the country. This paper contains some of the highlights of that study, the detailed results of which will appear later.

The information was assembled by questionnaires distributed to all state health departments, and all county and city departments with full-time executives. Each local health officer was requested by a letter from his state health officer or from the Public Health Service to submit a schedule for each of his full-time professional employees. In all, 1,148 jurisdictions were canvassed. The percentage of returns is shown in Table 1. There is total coverage of state jurisdictions, and 99 per cent coverage of counties, but only 89 per cent of the cities. However, only 3 cities with populations of 100,000 or over failed to respond. The others were all small cities, many of which are known to have full-time lay secretaries to the board of health but no full-time

TABLE 1

Coverage, by Jurisdictions, in a Study of Qualifications of Health Department Personnel

Type of Jurisdiction	*Number Canvassed*	*Number Replying*	*Per cent of Coverage*
States and territories	52	52	100.0
Counties and districts	811	808	99.6
Cities	285	254	89.1
Total	1,148	1,114	97.0

Number of states with 100 per cent returns 39
Total usable schedules received 15,679

* Read before the Health Officers Section of the American Public Health Association at the Sixty-eighth Annual Meeting in Pittsburgh, Pa., October 17, 1939.

professional personnel. With this circumstance in mind, it may be said that the coverage for cities with whole-time departments is about the same as that shown for counties. These proportions are in terms of jurisdictions. Our data on the number of professional employees in the several jurisdictions are too inadequate to use as a base against which to measure the percentage of individual returns, either as a whole or otherwise.

certain amount of academic education. This may be only elementary or high school work or it may reach the level of graduate study in a university. Since training in the upper educational levels may be, and usually is, fundamental to the more specifically professional training, it is important, as a background for discussing professional training, to know the level of academic training to which our personnel have attained.

TABLE 2

Personnel Returning Schedules, by Professional Status and Employing Jurisdiction

	Personnel Making Returns				
	All Personnel		*Jurisdiction*		
Professional Status	*Number*	*Percentage*	*State*	*County*	*City*
Medical officers	1,956	11.7	487	951	518
Nurses	7,900	47.4	1,186	2,846	3,868
Sanitation officers	4,341	26.1	977	1,203	2,161
All others	2,473	14.8	1,195	259	1,019
All personnel	16,670	.....	3,845	5,259	7,566
Percentage	.....	100.0	23.1	31.5	45.4

Answers were received from approximately 18,800 persons, but about 2,100 in part-time, institutional, or definitely clerical positions have been excluded from the analysis. The remaining 16,670 are distributed in Table 2 by professional status and type of jurisdiction. Almost half the data are from cities; a third from counties; and the remainder from state health department employees. The three largest professional classes are the medical, nursing, and sanitation groups, with nurses constituting almost half the total. Since these three groups represent nearly seven-eighths of all professional public health workers, the analysis in this paper is confined to them.

The schedule requested from each individual the data on his high school, college, professional, and public health training.

ACADEMIC TRAINING

Basic to all professional training is a

Table 3 shows the academic training of the three groups of health department employees under consideration. In addition to the training shown here, all physicians have taken the college course required for the degree of Doctor of Medicine.* For that reason, high school graduation is assumed for all, even though 20 (1 per cent) failed to report high school training. However, even if their professional medical training is disregarded, physicians are basically the best trained of the three groups —50 per cent have a college degree and 8 per cent have done some graduate academic work. A larger proportion of nurses than of sanitarians † have been

* A few who secured their medical training in Canada, Great Britain, or elsewhere abroad, bear other designations accepted as the equivalent of the M.D. granted in the United States medical schools.

† The term, as used here, includes sanitary engineers, supervisors of sanitation, "sanitary inspectors," "sanitarians," veterinary inspectors (only 70 in all), and inspectors of food, meat, and milk, as well as building inspectors and quarantine officers.

graduated from high school, but a much smaller proportion have continued beyond that level. Less than one-third of the nurses have any academic education beyond high school. Only 9 per cent have been graduated from college.

TABLE 3

Percentage Distribution of Physicians, Nurses, and Sanitarians According to Level of Academic Training

Level of Academic Training	Physicians	Nurses	Sanitarians
	Percentage		
High school work	..	23	33
High school graduation	20	46	11
Undergraduate college work	30	22	20
College degree	42	7	30
Graduate work	8	2	6
Total	100	100	100

Over half the sanitarians have attended college and more than one-third of them have college degrees. On the surface, it would appear that they are better trained basically than nurses. However, in addition to their academic training, practically all nurses have 2 or 3 years of professional training, whereas the sanitarians, generally, have only courses taken as a part of academic work or special courses in a public health school.

Although Table 3 does not show it, 15 per cent of the sanitarians did not report high school training. Whether this shows negligence in filling out the questionnaires or is an actual statement of the situation, could not be determined.

In Tables 4, 5, and 6 the academic training of the three groups is shown by type of employing jurisdiction. Although there is little jurisdictional difference in academic education among physicians (Table 4), the upper levels have been reached by a slightly higher percentage of state than of county or city employees.

No such uniformity exists among nurses working in the three types of jurisdiction (Table 5). County nurses have by far the best educational background, while city nurses have had much less education than either of the other two groups. Almost one-third of the city nurses have not been graduated from high school and an additional two-fifths have no more than a high school education in addition to their nursing training. Only 4 per cent have college degrees.

TABLE 4

Percentage Distribution of Medical Personnel According to Level of Academic Training and Type of Employing Jurisdiction

Level of Academic Training	Type of Employing Jurisdiction: State	County	City
	Percentage		
High school graduation	14	20	25
Undergraduate college work	32	31	27
College degree	44	41	41
Graduate work	10	8	7
Total	100	100	100

TABLE 5

Percentage Distribution of Nurses According to Level of Academic Training and Type of Employing Jurisdiction

Level of Academic Training	Type of Employing Jurisdiction: State	County	City
	Percentage		
High school work	22	14	30
High school graduation	47	49	44
Undergraduate college work	19	24	22
College degree	10	11	3
Graduate work	2	2	1
Total	100	100	100

Thirteen per cent of county nurses have college degrees, and an additional fourth have had some college work. Only 14 per cent have not been graduated from high school. State nurses have almost as much academic education as those in counties.

It is encouraging that county nurses are the best trained group, for in many situations they operate without nursing supervision, aside from minor direction by the state health department. For that reason, in county health units it is especially important to have individuals with the necessary background to plan

their own work under policies outlined by the health officer. Supplementary analysis shows that county nurses have a better academic background than even the administrative nurses in cities. Since many of these county workers have been appointed as a result of the stimulation given county health work by the Social Security Act, it is gratifying to see that a better trained personnel is being inducted into public health work.

TABLE 6

Percentage Distribution of Sanitarians According to Level of Academic Training and Type of Employing Jurisdiction

Level of Academic Training	Type of Employing Jurisdiction: State	County	City
	Percentage		
High school work	25	20	43
High school graduation	9	11	12
Undergraduate college work	15	27	19
College degree	43	34	21
Graduate work	8	8	5
Total	100	100	100

Differences between the academic training levels of state, county, and city sanitarians are somewhat similar to those mentioned for the nurses (Table 6). More county than state sanitation officers have been graduated from high school and attended college, but a larger proportion of state workers have continued their academic work to the point of securing a degree. City sanitation employees have decidedly less training than either of the other two groups. Almost half of them do not report high school graduation. About one-fourth have college degrees.

Space does not permit detailed comparison between training levels of administrators and staff workers in the three types of jurisdictions, but, in general, administrative personnel are better trained than their staffs. However, staff nurses and sanitarians in both state and county departments have better academic education than city supervisory nurses and sanitation directors, respectively.

PUBLIC HEALTH TRAINING

But perhaps more important from the standpoint of effective health service is the question of how well trained these individuals are in the specialty, public health, in which they are working. Table 7 presents these facts for the three types of personnel.

In this table individuals are tabulated at the highest level of training attained. However, it is not correct to assume that all persons tabulated at a given level of training have had comparable educational experience. Public health training schools have not stabilized hierarchies of training such as are found in the academic field. Furthermore, in the recent emergency efforts to improve the character of public health service, there have been inserted short-term "special" courses in the field which do not fit into the usual educational pyramid. In Table 7 and those that follow, preference is given to training received in recognized graduate public health institutions including schools of public health nursing.

TABLE 7

Percentage Distribution of Health Department Personnel According to Level of Public Health Training

Level of Public Health Training	Type of Health Department Personnel: Physicians	Nurses	Sanitarians
	Percentage		
None	46	51	71
Special courses only	24	9	24
Less than 1 year	9	24	3
One year or more	21	16	2
Total	100	100	100

The proportion of thoroughly trained personnel is much lower than we should wish. Admittedly, the physicians in public health have had their medical training, and the nurses are graduate registered nurses,* but aside from that, almost half the physicians and more than half the nurses have undertaken

* Three per cent of the nurses did not report registration.

public health work, the primary function of which includes health education and preventive measures, when their only training has been in taking care of the sick.

Even among those who have been exposed to some training in public health (other than experience on the job), almost half the doctors (24 per cent of the total) and more than one-sixth of the nurses (9 per cent of the total) have had no more than special courses such as are given at state institutes or other in-service field-training programs.

One-fifth of the physicians and one-sixth of the nurses have had as much as a year or more of graduate public health work, but only 1 out of 13 of the doctors and only 8 in 1,000 nurses have attained a professional public health degree.

Up to this point, public health training of sanitarians has not been considered since there is no definite professional standard, such as the M.D. or the R.N., which sanitarians must attain before they can undertake public health work. In view of this fact, the lack of instruction in the objectives and methods of public health, among sanitarians, is even more striking: almost three-fourths of them have had no public health training and only 5 per cent have had more than special short courses given in the field. Granting that 36 per cent of the sanitarians have college degrees, 70 per cent of which were obtained in sciences, such as engineering, nevertheless, the lack of instruction in the application of their scientific background to public health presents a situation which does not augur well for efficient health service for the public.

When the public health training of the three types of personnel is analyzed by jurisdiction, the differences in training are much greater than was shown for academic training, particularly for the medical personnel. The proportions of state and county physicians with 1 year or more of public health training are almost the same, although that for the state employees is slightly larger. On the other hand, among both physicians and sanitarians, the proportions of employees with no public health training are much lower for the counties than for the states or cities. However, this situation arises because one-third or more of the county personnel have had only special field training courses.

Very few of the physicians employed in cities have public health training. In Table 8 it will be noted that the levels of public health training among city physicians are quite similar to those previously shown for all sanitarians. Part of this low showing for the city medical workers is due to the excess proportion of staff physicians in the cities, 85 per cent of whom are without public health training. Since many city staff workers are rendering service in baby health stations, schools, and tuberculosis or venereal disease clinics, their lack of public health training is much less a detriment to efficient service than it otherwise might be, but there is little doubt that many would profit from the understanding of the public health point of view which would be obtained from specific training in the principles of the profession.

TABLE 8

Percentage Distribution of Health Department Medical Personnel According to Level of Public Health Training and Type of Employing Jurisdiction

Level of Public Health Training	*Employing Jurisdiction*		
	State	*County*	*City*
	Percentage		
None	47	31	73
Special courses only	18	32	13
Less than 1 year	7	15	2
One year or more	28	22	12
Total	100	100	100

Table 9 shows that the training differences among nurses in the three types of jurisdictions resemble very closely

those among medical workers, with approximately the same proportion in each type of jurisdiction having 1 year or more of training, but with fewer county than state nurses having had short special courses. Again the city group is far behind in the amount of public health training. Only 11 per cent of city nurses have 1 year or more of training in public health.

TABLE 9

Percentage Distribution of Health Department Nursing Personnel According to Level of Public Health Training and Type of Employing Jurisdiction

Level of Public Health Training	Employing Jurisdiction State	County	City
	Percentage		
None	39	40	62
Special courses only	11	6	10
Less than 1 year	27	33	17
One year or more	23	21	11
Total	100	100	100

Among sanitarians (Table 10), county workers have slightly more training than those in the other two groups, i.e., one-half of the county employees have had no public health training, as against three-fourths of those working in states or cities. Lack of training is particularly acute among state and city staff workers, 75 per cent or more of whom have had no public health training.

TABLE 10

Percentage Distribution of Sanitation Officers According to Level of Public Health Training and Type of Employing Jurisdiction

Level of Public Health Training	Employing Jurisdiction State	County	City
	Percentage		
None	76	53	79
Special courses only	15	37	20
Less than 1 year	4	7	*
One year or more	5	3	*
Total	100	100	100

* One-half of 1 per cent

A comparison of the training of recently appointed employees with that of the older workers furnishes some evidence on the progress made in improving the qualifications of personnel since the Social Security Act was put into effect. Employees appointed from 1936 to the time of the study were selected from each professional category as "new" employees, and their training was compared with the preparation of those who have worked in their present jurisdictions more than 3 years ("old" employees). With minor exceptions, in each group there is a higher percentage of individuals with 1 year of training in public health and a lower percentage of persons with no public health training among "new" employees than among the "old" employees.

Among nurses in county health departments, 24 per cent of the new group have 1 year or more of training in public health, but only 15 per cent of the "old" group have that much training. A similar situation is found among county health officers and physicians. Here, again, it might be pointed out that city employees, with the exception of physicians, do not follow this trend in as marked a degree as the county or state employees do. City sanitarians in particular are largely untrained in public health. The sanitarian group of "new" employees in cities is not significantly different from the older group except that, among the more recently employed, there is a higher percentage with no public health training.

The progress thus indicated toward building staffs that are better trained for the tasks that they are to undertake should be encouraging to all who are interested in seeing a better type of service rendered to the community.

SUMMARY

From a study of over 14,000 employees in official health agencies throughout the United States, it is found that medical officers show the highest level of public health training

among the three types of personnel, and county and state employees have more training than those in cities. Sanitation personnel are less well trained both basically * and in public health than either of the other two groups. Staff physicians and staff nurses in cities have had little training in either public health school or academic college. Among the physicians and the sanitarians, one-quarter report "special" or "in-service" courses as their only public health training. Almost half of all categories of personnel have no training in the specialty in which they are working.

It is axiomatic that the quality of health service is dependent upon the character and training of personnel responsible for rendering it. Although enthusiastic, untrained workers may accomplish much good for the community, frequently they waste time and effort in doing it. If public health is a specialty or profession, as we are striving to make it—one in which its workers should be schooled before engaging in its practice—then there is still much to be done before the educational and professional training of our public health personnel will have reached an acceptable level, not to mention the standard which the leaders in the field desire.

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* It has been pointed out that more sanitation officers than nurses have degrees; but 2 to 3 years' nursing training must be assumed for all nurses. This has not been taken into account in the discussion of their academic training.

Administrative Problems in Securing Proper Bactericidal Treatment of Eating and Drinking Utensils*

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DISHWASHING is only one of the important operations in eating and drinking establishments requiring regulation and supervision. There are three major objectives in any general sanitation program for eating and drinking establishments as a whole. They are as follows:

1. The establishment must be housed in a building suitable to that type of enterprise. The type and condition of the floors, walls, and ceilings; the adequacy of illumination and ventilation; the proofing of the structure against flies, rodents, and vermin; the water supply and sewage disposal, both as to adequacy and safety and other items conducive to good sanitation, are all important and require attention.
2. The installation of proper equipment and apparatus for carrying out the daily routine operations must be obtained.
3. The proper maintenance and daily operation of this equipment and apparatus must be obtained.

As in the case of milk sanitation, enforcement should be carried out by inspection personnel of the local health department. This personnel should be trained and in sufficient number to be able to give adequate supervision. The success of the program can be measured by periodic surveys and, in the case of dishwashing, by laboratory analysis of utensil swabs.

The present Memphis Food Ordinance sets forth certain specifications as to the type of construction, lighting, ventilation, and other items of sanitation which must be met by eating establishments. This ordinance, adopted in 1924, also specified that all utensils used in preparing, handling or serving food should be cleansed with soap and hot water after using.

In 1931 a tentative policy regarding the disinfection of dishes and eating utensils was prepared by the Health Department. This policy provided for the complete removal of all visible dirt from the dishes and eating utensils to be followed by disinfection either by means of hot water or some chlorine disinfectant. This policy was further strengthened in 1933 by the adoption of an amendment to the Food Ordinance making it unlawful to operate an eating establishment unless facilities for disinfecting and sterilizing dishes and glasses were provided.

Following the adoption of this amendment the efforts of the depart-

* Read before the Southern Branch American Public Health Association at its Eighth Annual Meeting in Memphis, Tenn., November 21, 1939.

ment were concentrated on its enforcement. This program consisted of three parts.

1. Installation of approved automatic water heating facilities
2. Installation of three compartment wash vats
3. Operation of this equipment in such a manner as to obtain proper cleaning and sterilization of the dishes and eating utensils

This improvement program was carried on in conjunction with the regular program already established. The inspectors were equipped with thermometers and chlorine testing outfits and instructed to determine the temperature of the wash water and the strength in p.p.m. of the chlorine disinfectant solution. Due to the lack of personnel both in the field and in the laboratory routine collection of swabs on glassware for laboratory analysis was not done.

Early in 1938, however, a more complete and detailed policy outlining equipment and operating methods for compliance with the ordinance on dish washing was adopted. Swabs were obtained on glassware at 347 eating establishments for the purposes of checking efficiency and of being able to report to the proprietors and the dish washers the kind of a job being done. The following results were noted.

1. Of these 347 establishments only 106, or approximately 30 per cent, were maintaining proper strength disinfecting solution.
2. Only 108, or 31 per cent, had bacteria counts less than 200 per cc.
3. It was quite noticeable that the places with the least equipment were obtaining the best results. Establishments with only one vat had an average count of 6.300, those with two vats 40,000, while those with three vats had an average count of 53,000.
4. Those establishments with a chlorine disinfectant solution of approved strength obtained the best results. However there was no appreciable difference in the results obtained between the different type of chlorine used nor the matter in which it was applied, that is, either manual or by automatic equipment.

This swab collecting was carried on by the regular inspectors and had to be discontinued. At the beginning of 1939 it was possible to increase the personnel of the division, and the collection of glassware swabs at eating establishments was started as a routine procedure. This program does not yet include all establishments, but rather a representative number in the downtown area and a few of the larger ones in the outlying areas. One hundred and sixty-nine places were included. Collecting samples at the rate of 75 a week it has been possible to cover these places approximately twice a month.

After the program had been in operation for about 6 months, the bacteria counts on the various establishments were averaged. Of the 169 places, 61, or only 36 per cent, had average bacteria of 200 per cc. or less. This was apparently but a slight improvement over the results obtained during the preceding year. The results however are not entirely comparable. The first group of swabs was taken as close to the sterilization tank as possible. The presence of chlorine was often quite noticeable on the glassware sampled, a fact which no doubt influenced the final results. The second group of swabs was taken on glassware from the service table just before it was served to the user and after possible contamination by improper storage or handling. This gave a true picture of the existing conditions and indicated clearly that we were not obtaining the desired results, that is, for all practical purposes sterile glassware and eating utensils in our cafés and restaurants.

It was then decided to make a study of conditions existing at two selected groups of establishments. The first group selected included 28 places which had average bacteria counts less than 100 per cc.; the second included 28 which had the highest average bacteria counts. The average counts for this

group ranged from 2,000 to 45,000 per cc.

A list of items which were common to both groups was then selected for study. This included (1) personnel, (2) type of building, (3) cleanliness, (4) type of equipment, (5) operation of equipment, (6) storage of glassware. All of these it was felt would have some direct bearing on the results which had been obtained.

Personnel may be divided into two classes, (1) the owners of the establishments, and (2) those who are employed to carry out the dishwashing operations. Each is a separate and distinct group, and each offers different problems.

The fact that much better coöperation on the part of the operators or owners is obtained at some places than at others may be due to the fact that the party being dealt with is either intelligent, ignorant, interested, or indifferent. A classification by these standards and a correlation of the results obtained was found impossible. Many were interested but too busy to give the matter their personal supervision. Quite often the best results were obtained in small places where the owners had complete supervision of all operations and were in close contact to see that they were properly carried out. The most difficult type of operator to handle is the one who is indifferent to the value of sanitation.

The issuance of certificates to milk plant operators or superintendents by health departments has proved quite successful in some states and communities. It seems reasonable to believe that chefs and operators of eating establishments could be certified under a similar plan, and a satisfactory improvement in the type of personnel should be obtained providing certification was carried out in a fair and impartial manner.

The personnel employed to wash dishes are probably less responsible than any other group in eating establishments. They are the least paid and as a rule the most indifferent to the value of sanitation. Their ideas regarding personal hygiene are often vague. An effort was made to obtain some ideas as to length of experience of these workers. While many gave histories of long experience, inquiry disclosed that they had been employed but a short time in their present positions. The age, color, and apparent length of service of this group of employees seem to have but little bearing on the results obtained.

Until the importance which this group plays has been realized and steps taken to raise the standards of dishwashers it is going to be most difficult to secure satisfactory results.

The problem of obtaining proper type of construction at eating establishments is often difficult. At times it is almost necessary to adapt the business to the building rather than the building to the needs of the establishment. For the purpose of this study only a few of the more important items such as floors, walls, cleanliness, lighting, and ventilation were taken into consideration. Of the 28 establishments with low bacteria counts in group one, 92 per cent meet the building requirements, while in group two only 60 per cent conform.

Three compartment vats have been installed in a larger number of places than the report indicates. In some cases tubs or buckets were used for washing and sterilizing glassware, while in others some of the vats were bypassed during these operations. In group one, 89 per cent of the establishments used three compartment wash vats, while this equipment was in use in only 78 per cent of the places falling in group two.

A large per cent of the establishments included in the study have installed water heating facilities. It is difficult

however to maintain a temperature above 100° F.—preferably at least 110° F.—in the dishwashing compartment. The vats are filled and the detergent added at the beginning of a rush period, and not emptied or added to until such time as the rush is over or until the water becomes so dirty as to make dishwashing difficult. The temperatures ranged from 70° to 110° F. The average temperature was between 85° and 95° F. Only 32 per cent in each group maintained proper water temperature during the dishwashing period.

To date it has not been possible to collect samples of dish water for laboratory analysis. This will be done as soon as time permits as it will be one means of emphasizing the need of maintaining a reasonably clean dish water throughout the entire period. In making the check on the cleanliness of glassware only that which appeared greasy or cloudy was considered dirty. That which appeared to be soap spotted or water marked was passed as clean glassware. Seventy-five per cent of the places in group one and only 30 per cent in group two were apparently cleaning the glassware properly.

A proper strength chlorine disinfectant solution was maintained in 75 per cent of the establishments in group one, and 57 in group two. As in the preceding study, neither the type of chlorine used nor the manner in which it was applied, that is, manually or automatically, had a direct bearing on the results obtained. Of the 37 establishments using automatic equipment 24, or only 64 per cent, maintained the chlorine solution while only 48 per cent had average bacteria counts of less than 100 per cc. Of the 19 establishments applying the chlorine manually 63 per cent maintained a proper strength chlorine solution and 57 per cent had average bacteria counts of less than 100 per cc.

The objection on the part of the public to the odor of chlorine in drinking glasses is an influence which has been hard to overcome. Many operators frankly state that they do not use chlorine for that reason. Others do not immerse the glassware for the required length of time in an effort to eliminate this objection. The procedure quite often was merely to dip the glasses, followed immediately by a clear water rinse. The lack of sufficient glassware especially during the rush periods is a factor which influences the length of the holding period. Seventy-one per cent of group one complied with this item, while only 42 per cent of group two did so.

It is of little value to obtain proper cleaning and disinfection of eating utensils if they are allowed to become contaminated by improper handling or storage afterward. The health department policy recommends that glassware be stored in wire baskets after disinfection. So few places surveyed however had this type of storage that a comparison by this standard would give but little information. It was decided to take swabs of the drain boards, trays or shelves used for glassware storage. An area equal to that required for the storage of three glasses was swabbed. Only those counts which were 100 or less were considered as satisfactory. By this standard 75 per cent of group one provided proper storage, while only 28 per cent of group two did so. The counts ranged from zero to 60,000, which is the highest recorded by the laboratory when plates of this type are being counted.

The efforts of this department are being exerted in the direction of education of all dish washing personnel and the proprietors with less emphasis on arbitrary orders and less reliance on equipment alone. The factors involved are not as simple as at first assumed. A more personal relationship between

the inspectors and the food handlers will be helpful in uncovering weak points and in making the handlers sanitation conscious. The collection of swabs on glassware and dishes will be continued.

SUMMARY

1. Dishwashing is one operation in an eating and drinking establishment, and control of this operation is facilitated in establishments properly housed, equipped, and operated.

2. The dishwashing program is based on an ordinance amendment adopted in 1933 and two policies outlining proper equipment and operation considered necessary for obtaining satisfactory results.

3. Two series of glassware swabs, the first at 347 establishments and the second consisting of approximately 12 sets at each of 160 establishments are analyzed, compared and discussed.

4. Although it is felt that the department is making progress in this program, it is not possible to show by laboratory tests any very significant or conclusive results.

5. Reliance will be placed on an intensive educational campaign with the laboratory tests as a foundation and with less emphasis on arbitrary orders and equipment.

Health Exhibits*

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THE health exhibit is one of the main media used in health education. Like any other medium, it has its advantages and its limitations. In order to be successful, the health exhibit must be started with the right story, in the right way, in the right place, with the right means, and with the right aims.

AIMS AND REQUIREMENTS

Workers in health education are more or less agreed that the aim of health education includes not only dissemination of information on personal and public health; its final aim is to impel action for better and healthier living through personal habits and in community life. Having this aim in mind, the health exhibit should—

1. *Spread definite knowledge*—Everyone must be acquainted with certain facts before he can interpret them for the life of himself and his family. Before acting in the right way one has to think in the right way.

2. *Strengthen the will to a healthy life*—Public health is purchasable to a large extent, but personal health cannot be bought. Besides the heredity factor, personal behavior is important. Stimulating and increasing the responsibility for healthy living is the second step. Even if the individual gives little thought to his health at a given moment, he will start thinking the moment he has a family of his own.

3. *Be the means of leading more people earlier to proper facilities for prompt diagnosis and treatment*—After the life expectancy has been raised to nearly the utmost level, we should further help people to get the best possible chance for a healthful life. Health exhibits are the best bridge between preventive and curative medicine, between public health activities and the medical profession.

4. *Sharpen the conscience with respect to questions of public health*—The individual's well-being depends not only on his personal health habits, but also on the general welfare of everyone in his community. As a very wise man stated: "Their health is your health."

THE AUDIENCE

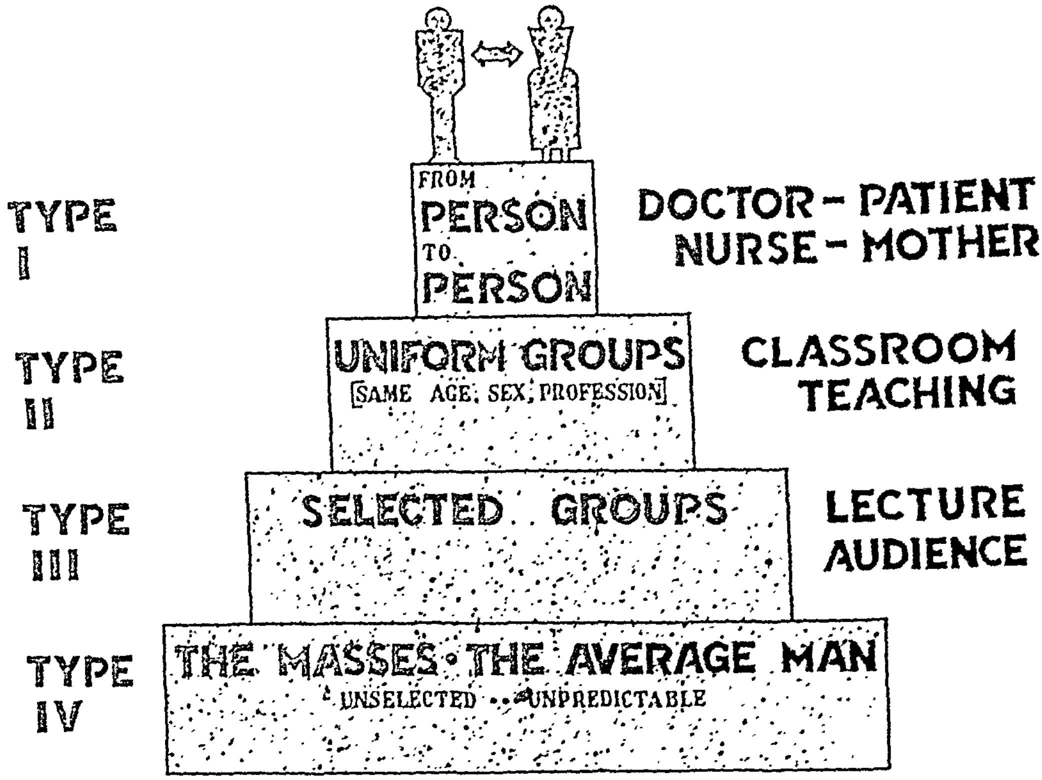
Before discussing health exhibits in detail, we should determine the place health exhibits hold among other means and methods, which are more or less determined by the audience. There are four main types of audiences:

1. Individual (as a patient in a doctor's office, or a mother in her home visited by a nurse)
2. Uniform groups of the same age, sex, or profession (as in classroom teaching)
3. Unselected groups (lecture audience)
4. The masses—the average man (unselected, unpredictable)

The effectiveness of health education activities is greatest with type 1 and becomes less with each of the succeed-

* Presented at the Sixth Institute on Public Health Education, American Public Health Association, preceding the Sixty-eighth Annual Meeting in Pittsburgh, Pa., October 15, 1939.

FIGURE 1—The Audience



ing groups. Audiences of types 1 through 3 are more or less known in their psychological structure, but we know little about type 4. This is made up of the people who usually do not care, never or seldom listen to a radio talk or read a pamphlet or book, do not go to lectures, and rarely go to see a doctor, a dentist, or a nurse. Here the exhibits have their particular opportunities and obligations: to get these people out of the no-man's land which is usually larger than we realize.

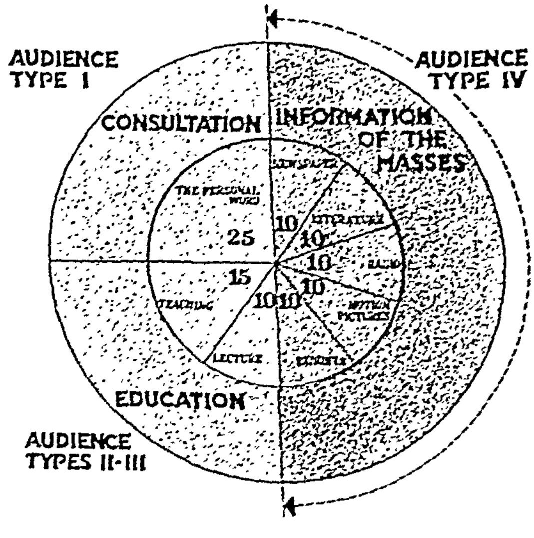
EVALUATION OF THE MEANS IN HEALTH EDUCATION

We are still in the trial and error period in health education, especially in visual education. It may be helpful to evaluate the means we usually use. There are two main groups: (1) the personal medium, with the spoken word in consultation, teaching, lecturing, and demonstration; (2) the mechanical media, as in printed matter, radio, motion pictures, and exhibits.

RELATIONSHIP OF AUDIENCE GROUPS AND EFFECTIVENESS OF MEANS IN HEALTH EDUCATION

The mechanical media are usually used to give information to the masses as the first aid in our field. There can be no doubt that the effectiveness as

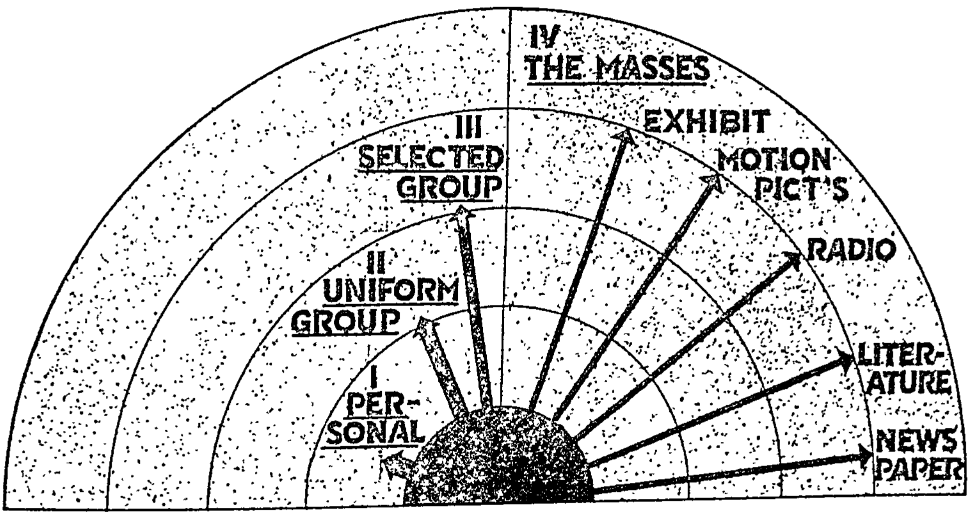
FIGURE 2—Relationship of Means and Character of Audience Types



well as the costs of the personal media are greater than those of the mechanical means. On the other hand, we can reach masses only by the mechanical means so that we may transform these uninterested masses into interested individuals.

meet the man in the street we should go to the street—why can we not use more empty shops for exhibits? Waiting rooms in railroad stations may serve the purpose. Annual health exhibits in the local public library should be a routine matter; lunchrooms and cafeterias of

FIGURE 3—Intensity and Range of Health Education Means



large commercial houses and factory plants should be given more consideration as fitting exhibit places. Health exhibits in hospitals are usually successful.

THE BASIC UNIT

Medicine is science and art, and so are health exhibits. Content and form have the same value; both have to be good in order to make a fine exhibit. An exhibit will spread no more energy than we put into it. To begin with, we need a manuscript full of interesting facts and a vivid interpretation in plain English. Then we need "transformation into visual form." It takes courage to select the subject matter, to simplify it, to put emphasis where it belongs. Health exhibits are usually so dull because they exclude questions of contemporary interest.

PLACEMENT

It seems quite necessary to look for new locations for our health exhibits. We now have them mostly at conventions, county fairs, clinics, and health departments. But in order to reach the people we have not interested up to now we must look for new locations. To

FROM THE SECOND TO THE THIRD DIMENSION

It is nearly five hundred years since the discovery of movable printed letters. Education all this time has been focused around the book, either with or without illustrations. Most exhibits today are still only enlarged book pages. In exhibits people do not like to read, they like illustrations to look at. And since the invention of photography and motion pictures they have the right to expect them.

1. *Two-dimensional exhibit material* —Letters, figures, pictures (black and white), pictures (colored), photographs (black and white), photographs (colored), phototransparencies, motion pictures. This list represents more or less

material used on walls. But the exhibit offers us a third dimension and we should make more use of it because we can come closer to life.

2. *Three-dimensional exhibit material*—Diorama (photo cutout or plastic), wax models, specimens, animated diagrams, models—with or without motion, visitor participation items, the object, living demonstrations.

The chief advantage of health exhibits compared to all other media in health education is the possibility of using three-dimensional materials.

3. *Types of Exhibits*—

1. Single wall exhibit
2. Single booth or show-window exhibit
3. Coördinated booth series
4. Three-dimensional functional exhibit

The old-fashioned wall and booth exhibits are good for scientific exhibits and short-time conventions, but are usually too uniform for general health exhibits. Wherever it is possible, an originally designed floor plan should be created to make an exhibit more attractive. Here the highest aim of an exhibit can be accomplished: content, form, and space making one visual unit.

Up to now we have not been able to find standards for the building of a good exhibit on a square foot price basis. Nor has it been possible to make a good exhibit by "recipe." It still requires a combination of sound knowledge, enthusiasm for education, good showmanship, and a feeling for the artistic. It is easier to make more and bigger mistakes in exhibits than in other fields, but sometimes the bigger risk is rewarded by greater success—a success that depends on the inner value of importance of the story and on the seriousness of the message.

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Treatment as a Part of Services of Health Departments*

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THE writer is fully aware that this subject is one of controversy. Furthermore, he is quite prepared to find an accusing finger pointed at the record, at least by some, who may denounce what appears as evidence of that troublesome bugaboo so commonly if vaguely defined as "State Medicine."

If in spite of such discouraging prospects the task is undertaken, it is because the writer believes that differences of opinion should not preclude discussion, and that particularly where differences of opinion have led or may lead to difficulty, it is wisdom to follow the counsel of de Montaigne, French philosopher and essayist, who pointed out that "most difficulties arise from misunderstandings and therefore can be cleared by discussion." Since it appears that already some rather unfortunate misunderstandings do exist on the subject of treatment as a part of the services of health departments, it seemed a justified and probably useful undertaking to attempt to clear these by calm, dispassionate examination in the hope that when so examined "Present fears might prove less than horrible imaginings," as the Bard of Avon had it.

Finally, and by no means the least of the reasons for presenting this paper, it should be here recorded that the writer was invited to do so.

Inasmuch as it is the purpose of this paper to deal not with just theory and abstractions, but with reality, it was manifestly important that as a first step information be obtained as to the type and extent of treatment facilities now under control of health departments. Here, however, the inquiry came upon its first difficulty for, strange as it may seem, a search of various likely sources failed to furnish the desired statistical data, that is to say, information as to the number and types of hospitals, sanatoria, health centers, or clinics at present under the administrative direction of health departments.

Apparently not one of the various national organizations whose interest touches or deals specifically with the problem of the care of the sick has so far in its listings of treatment facilities tabulated these according to the specific governmental agency that is in administrative control.

This disclosure made it interesting as well as necessary to explore more fully this aspect of our present-day practice in the care of the indigent sick in order to obtain something that might prove reasonably suggestive for the purpose of discussion.

Accordingly a questionnaire was prepared, designed to obtain first factual data concerning treatment facilities now under health department control; second, to obtain information as to the trend in the establishment or acquisition of such service: and finally, if possible,

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* Read before the Health Officers Section of the American Public Health Association at the Sixty-eighth Annual Meeting in Pittsburgh, Pa., October 19, 1939.

to obtain an expression of opinion on the question of placing the function of treating the medically indigent sick under health department control. This latter point was to be determined by asking the health officers' personal opinion on the question, securing the reaction to the matter by the medical profession, and lastly by securing the health officers' opinion concerning the attitude of the general public on the question.

The services on which information as to the current practice by health departments was sought were listed as follows:

Cancer
Communicable diseases
Dental treatment
Emergency
General service (Includes hospital services not listed separately)
Heart
Home delivery (Obstetrical)
Infant and child welfare
Maternal
Mental
Orthopedic
Tuberculosis
Venereal diseases
Visiting physicians who give general treatments in patients' homes

The questionnaire, furthermore, sought to ascertain whether these services were rendered through outpatient departments or clinics for ambulatory patients, or through hospitals for bed patients, and also whether the services were administered by city, county, or state health departments.

Questionnaires were sent to 48 states and 47 large American cities, the latter all being in the 200,000 or more population group. Up to the present writing reports were received from approximately half of this city and state health department group. In view of the fact that the request for the paper and the sending of the questionnaires left only the summer months for the return of the desired data, this may be regarded as a fair response.

Turning now to an examination of the tabulated material, Tables 1 and 2 show a summary of the *outpatient* and *hospital facilities* respectively, currently available for the indigent sick under health department control in the reporting large cities.* For the outpatient treatment, facilities to deal with the venereally infected person appear as the most frequently offered service, slightly better than 90 per cent of the reporting cities claiming such facilities. Next in frequency of the established services appear the communicable diseases, maternal, infant and child welfare, and tuberculosis, 68.2 per cent of the reporting communities stating that they maintain these services.

Emergency services and visiting physician services were reported by 9 of the 21 cities reporting. Better than one-third of the cities reported clinical service for cardiacs, home delivery, and mental hygiene; 6 out of 21 cities offer orthopedic service, and 5 out of 21 cities operate cancer clinics.

Bed care for the medically indigent sick in hospitals under health department control (Table 2) is shown as

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* RESPONSE TO QUESTIONNAIRES

States Responding	*Cities Responding*	*Cities with Which Contact Was Made Not Reporting*
Alabama	Akron	Atlanta
Connecticut	Baltimore	Boston
Delaware	Birmingham	Buffalo
Idaho	Chicago	Columbus
Indiana	Cincinnati	Dayton
Maryland	Cleveland	Detroit
Massachusetts	Dallas	Denver
Missouri	Indianapolis	Elizabeth
Nebraska	Jersey City	Houston
New Hampshire	Kansas City, Kans.	Memphis
New York	" " Mo.	New York City
North Carolina	Los Angeles	New Orleans
North Dakota	Louisville	Newark
Oklahoma	Milwaukee	Oklahoma City
Oregon	Minneapolis	Omaha
Rhode Island	Oakland	Paterson
South Dakota	Pittsburgh	Philadelphia
Texas	Providence, R. I.	Portland, Ore.
Vermont	Rochester, N. Y.	San Antonio
Virginia	St. Louis	Seattle
Washington	San Francisco	St. Paul
Wyoming	Syracuse	Worcester
	Toledo	
	Washington	

TABLE 1

Summary of Outpatient Facilities Currently Available for the Indigent Sick under Health Department Control in Large Cities, August, 1939

Service	*Total Cities Which Replied*	*Cities in Which Service Is Available*	*Cities in Which Service Is Not Available*	*Percentage of Cities Which Have the Service*
Cancer	21	5	16	23.8
Communicable Diseases	22	15	7	68.2
Dental Treatment	22	13	9	59.1
Emergency	21	9	12	42.9
Heart	21	8	13	38.1
Home Delivery	21	7	14	33.3
Infant	22	15	7	68.2
Maternal	22	15	7	68.2
Mental	22	8	14	36.4
Orthopedic	21	6	15	28.6
Tuberculosis	22	15	7	68.2
Venereal Diseases	22	20	2	90.9
Visiting Physicians	21	9	12	42.9

TABLE 2

Summary of Hospital Facilities Currently Available for the Indigent Sick under Health Department Control in Large Cities, August, 1939

Service	*Total Cities Which Replied*	*Cities in Which Service Is Available*	*Cities in Which Service Is Not Available*	*Percentage of Cities Which Have the Service*
Cancer	22	8	14	36.4
Communicable Diseases	22	16	6	72.7
Dental Treatment	21	7	14	33.3
Emergency	21	10	11	47.6
General Service	21	7	14	33.3
Heart	21	8	13	38.1
Infant	21	8	13	38.1
Maternal	21	7	14	33.3
Mental	20	6	14	30.0
Orthopedic	20	6	14	30.0
Tuberculosis	21	8	13	38.1
Venereal Diseases	20	6	14	30.0

follows: Hospital care for communicable disease patients is the most frequently offered type of service, as might have been expected. Next follows emergency hospital service, with hospital care for infants, cardiacs, and the tuberculous in third place in slightly better than 38 per cent of the reporting cities. Eight out of 22 cities reporting maintain beds for cancer patients, and 7 out of 21 cities offer a general hospital service.

So far as these reports deal with the treatment facilities for the indigent sick through clinic or hospital service under the administrative control of county and state health departments, it was of course to be expected that these would not show the same development or activity that one might look for in cities.

For the ambulatory patient the reports indicate that the treatment facilities for the venereally infected patient lead in the service provision of county health departments. Out of 1,089 counties reporting, 313, or 28.7 per cent, state that they maintain such clinic

TABLE 3

Summary of the Number of Counties Which Have Outpatient Facilities Currently Available for the Indigent Sick under Health Department Control by States, August, 1939

Service	Total Number of Counties Reported	Counties in Which Service Is Available	Counties in Which Service Is Not Available	Percentage of Counties Which Have the Service
Cancer	1,089	0	1,089	.0
Communicable Diseases	1,089	74	1,015	6.8
Dental Treatment	1,089	3	1,086	0.3
Emergency	1,089	2	1,087	0.2
General Service	1,089	0	1,089	.0
Heart	1,089	0	1,089	.0
Home Delivery	1,089	3	1,086	0.3
Infant	1,089	80	1,009	7.3
Maternal	1,089	79	1,010	7.3
Mental	1,089	0	1,089	.0
Orthopedic	1,089	2	1,087	0.2
Tuberculosis	1,089	103	986	9.5
Venereal Diseases	1,089	313	776	28.7
Visiting Physicians	1,089	0	1,089	.0

services. Tuberculosis clinic services are offered by 103, or 9.5 per cent of the county health departments reporting. Table 3 also shows that 7.3 per cent of the counties offer services for maternity and infant welfare. Nearly 7 per cent of these counties also provide for communicable disease services. As for the other services listed as offered by city health departments, these are either not included at all in the present health service set-up of the reporting counties, or receive only minor attention.

Institutional care by county health departments is rendered in the reporting counties in the following order of frequency: First, tuberculosis, then venereal disease, followed by communicable disease and infant welfare. For all of these classes of patients the development of service does not exceed 7.5 per cent of the counties (1,089) reporting (see Tables 3 and 4).

If the returns from county health departments show apparently a minor development of services, the reports from

TABLE 4

Summary of the Number of Counties, Which Have Hospital Facilities Currently Available for the Indigent Sick under Health Department Control, by States, August, 1939

Service	Total Number of Counties Reported	Counties in Which Service Is Available	Counties in Which Service Is Not Available	Percentage of Counties Which Have the Service
Cancer	1,089	0	1,089	.0
Communicable Diseases	1,089	67	1,022	6.2
Dental Treatment	1,089	0	1,089	.0
Emergency	1,089	0	1,089	.0
General Service	1,089	1	1,088	0.1
Heart	1,089	0	1,089	.0
Infant	1,089	67	1,022	6.2
Maternal	1,089	0	1,089	.0
Mental	1,089	0	1,089	.0
Orthopedic	1,089	0	1,089	.0
Tuberculosis	1,089	82	1,007	7.5
Venereal Diseases	1,089	75	1,014	6.9

TABLE 5

Summary of Outpatient Facilities Currently Available for the Indigent Sick under Health Department Control in the Various States, August, 1939

Service	*Total States Which Replied*	*States in Which Service Is Available*	*States in Which Service Is Not Available*	*Percentage of States Which Have the Service*
Cancer	20	2	18	10.0
Communicable Diseases	20	4	16	20.0
Dental Treatment	20	3	17	15.0
Emergency	19	0	19	.0
Heart	20	0	20	.0
Home Delivery	18	3	15	16.7
Infant	19	5	14	26.3
Maternal	19	4	15	21.1
Mental	19	2	17	10.5
Orthopedic	19	7	12	36.8
Tuberculosis	20	6	14	30.0
Venereal Diseases	20	15	5	75.0
Visiting Physicians	17	0	17	.0

state health departments in turn disclose a surprising spread in the variety of services to ambulatory patients. Only emergency service, services to cardiacs, and services through visiting physicians were not claimed in the listing of the 14 services given above by the reporting state health departments. Clinics for the venereally infected are offered in 75 per cent, or 15 of the 20 reporting states. Orthopedic clinic services are next in frequency, 7 of 19 reporting states listing these facilities (Table 5).

Hospital service for the medically indigent sick under state health department control shows orthopedic service at the head of the list, 8 out of 19 states reporting such hospital services. Tuberculosis follows with hospital service offered also for the venereally infected patient and cancer patients (Table 6).

In summation of this point, that is, type and extent of services which the questionnaire attempted to establish, the following appears:

Among the reporting cities the out-

TABLE 6

Summary of Hospital Facilities Currently Available for the Indigent Sick under Health Department Control in the Various States, August, 1939

Service	*Total States Which Replied*	*States in Which Service Is Available*	*States in Which Service Is Not Available*	*Percentage of States Which Have the Service*
Cancer	19	2	17	10.5
Communicable Diseases	19	..	19	.0
Dental Treatment	19	..	19	.0
Emergency	18	..	18	.0
General Service	18	..	18	.0
Heart	19	..	19	.0
Infant	17	..	17	.0
Maternal	17	..	17	.0
Mental	19	..	19	.0
Orthopedic	19	8	11	42.1
Tuberculosis	19	5	14	26 3
Venereal Diseases	17	2	15	11.8

patient facilities most commonly found under health department control are those for venereal disease, communicable disease, and tuberculosis. The hospital services most frequently under health department control in these cities were those for communicable disease.

Among counties and states the most commonly found outpatient treatment service was likewise for venereal disease while the hospital facilities in the lead were those for tuberculosis cases in the counties and for orthopedic patients in the states represented in the returns.

The second point which the questionnaire tried to determine, that of the trend in the establishment of outpatient and hospital facilities under health department control, found no significant response in the returned material. However, there can be little question that the appearance and growth of orthopedic, venereal disease, tuberculosis, maternal and child welfare services in state, county, and city health departments have been greatly and essentially stimulated by federal grants under Titles V and VI of the Security Act.

For example, in the year ending June 30, 1936, when the first federal grants for services for crippled children were made to 38 states, they went to state health departments in 16 of these states. Since then 5 state health departments have been added to the list receiving grants for crippled children and in 5 other states the services for crippled children were transferred from other state agencies to the state health departments. During this period (1936–1939) only one state (Georgia) transferred its crippled children's program from the health department to another agency.

At present 26 health agencies, including the District of Columbia, Alaska, and Hawaii, are administering the crippled children's program in the state. Other state agencies administering these services are:

	States
Welfare Department	14
Education Department	5
Crippled Children's Commission	5
State University	1

Maternal and child health grants under Title V of the Security Act go, as of course is known, from the Children's Bureau directly to state health agencies. So also do the grants under Title VI of the Security Act from the U. S. Public Health Service as do also the funds available under the Venereal Disease Control Act.

The third and last point in our questionnaire sought to obtain the attitude of the health officers toward the question of placing the function of treating the indigent sick under health departments. It was also pointed out here that we should like to get the health officers' opinions concerning the reaction of the physician in private practice as well as that of the public in general toward this question.

TABLE 7

Attitude of Health Officers, General Public, and Physicians Toward Placing the Function of Treating the Indigent Sick under the Health Department, Cities and States, 1939

	Total Replies	In Favor	Opposed	Percentage in Favor
Cities:				
Health Officer	20	11	9	55.0
General Public	9	8	1	88.9
Medical Profession	14	6	8	42.9
States:				
Health Officer	15	3	12	20.0
General Public	7	5	2	71.4
Medical Profession	10	1	9	10.0

In Table 7 is presented the result of the tabulated replies. From this it appears that a majority of the health departments in the large cities favor an extension of such service whereas the majority of the state health officers represented do not. Both groups of health officers seem to be of the opinion that a very substantial majority of the public, both in the city and in the country think well of such a service set-up. However, as they see the reaction of the physician in private practice they feel that the latter is opposed to such a service set-up. It is interesting to note, however, that in the opinion of the reporting health officers, the feeling of opposition of the physicians in private practice is materially less in the large city than is the case with the country practitioner.

DISCUSSION

In evaluating the data presented it must of course be clear at once that they are not conclusive.

The reports submitted give neither a picture of all of the treatment facilities available to the medically indigent sick in the country, nor do they give us a picture of all of such facilities now available through health departments. What does appear is that treatment of the medically indigent sick is given by health departments in quite a variety of services; that the practice has seen considerable extension within recent years; that variety of type of service is more marked in the large cities, and that a majority of the reporting health officers from the cities approve such an extension of service by health departments. That there is less approval of treatment service by health departments in the group of the reporting state health officers may be because the state health officer after all is not so immediately confronted with the needs for service which the health officer in the large centers of population must face.

The division of opinion concerning the question of treatment as a proper function of health departments arises from differences of opinion concerning the function of health departments, and more particularly from misunderstandings and honest differences of opinion concerning the meaning and purpose of such terms as "prevention" and "treatment."

Significantly, a majority of the city health officers declaring themselves in favor of treatment service state that "no hard and fast lines can be drawn between prevention and treatment service, but that these services inevitably merge into one another." On the other hand, the opponents declare "treatment is a private matter; prevention is the public function."

The difficulty in such a categorical stand is that it does not solve the matter. For example, is the time-honored practice of vaccination for smallpox prevention, or is it treatment for the purpose of prevention? It must be clear that if our procedure in the matter of smallpox represents a proper health department activity, then certainly as medical science discovers procedures by which other illnesses may be prevented, these too would properly come within the purview of health department activity.

But "practice" does not always consist in the administration of specific immunizing agents. The withdrawal of the sick and infected from public contact is again an old and time-honored practice in the protection of the public health—hence hospitals for communicable disease, sanatoria for the tuberculous, and clinics for the venereally infected.

A further consideration that must not be overlooked here is the economic aspect. According to the most recent report of the American Medical Association there are 1,728 governmental hospitals in the United States with a total

of 815,136 beds—considerably more than half of all beds available in all of the registered hospitals in this country. Since most of the governmental hospitals are of a custodial character, it must be realized that their maintenance represents a substantial burden on the taxpayer. To illustrate: the cost of hospitalizing nervous and mental patients alone, according to Dr. Clarence Hincks, is in excess of $200,000,000 a year.

Much of the illness which brings these and other patients into governmental hospitals is preventable. If preventable, then why not provide the means through clinics for early diagnosis and treatment and so not only conserve the health and working capacity of the individual, but also lessen the cost of the ofttimes unprofitable institutional care. Since the public pays at all events the public has the right to insist on the less expensive method if this serves as well.

However, at this point it may be asked: Granted that communities have the right as well as the obligation to establish and maintain such treatment facilities, why should these be under health department control? The answer is—Why not? Why should clinics and hospital service have no place in a program of service designed for the protection of the public health and this through departments created expressly for the protection of public health? It is the writer's personal experience through a considerable number of years of service in public health that a more efficient, and therefore more economical, service can be rendered when clinic and hospital services are not separated from the general health department program. This too, I am happy to note, seems to be the experience of other health officers who have expressed themselves in the recent inquiry. Let me make clear again that the services under discussion are designed for the medically indigent sick and not for the public in general.

Let us now briefly deal with some of the other arguments that one hears advanced when this subject is under consideration. It is stated that before health departments take on treatment service responsibility it would be better if they would first perfect themselves in present health department practices. In answer to this I am moved to recall the experience I had with a friend who never bought a radio because he wanted to put it off until he could obtain the perfect radio. I submit that things terrestrial being what they are, we shall never reach perfection. This does not, however, justify the postponement of action where action is necessary and shows reasonable chances for good.

Again it is claimed that medical services under health departments or under government auspices could never be as good as those rendered by the physicians in private practice. It is somewhat difficult to follow this line of reasoning. Presumably the quality of service is influenced by the fact that in the one instance the practitioner receives a salary and in the other instance is made to collect his own bills. It is true that private practice still provides the largest income for some of the practitioners of medicine. It does not follow, however, I am certain, that such practitioners with large incomes are always of the best quality, nor yet that the person who renders service on a salary is for that reason less competent. On this point one must in passing call attention to the fact that the services at the Bureau of Standards, at university research laboratories, and in industry in general are on a salary basis. It does not appear that this service by reason of this fact is conspicuously of a poor quality.

It has been stated that public service would of course be of an undesirable quality by reason of political interference. No doubt public service does run the risk of political interference.

However, against such arbitrary interference Civil Service has been established by public opinion. Again it is the writer's personal experience over many years of service that most helpful support and coöperation can be secured from those in the seats of government as these representatives are given a chance to understand the objectives of service and are assured that these are reasonable and honestly sought.

As for the argument that treatment service under health departments is objectionable because it would interfere with private practice, this manifestly is invalid because the services to be rendered are to the medically indigent sick. It is unfair to make the medical profession carry this burden. It is a public responsibility, the cost of which should be borne by all of the public and not just by the medical profession.

Finally, it must not be overlooked that, as Dr. Sigerist has pointed out, "The history of medicine shows that the quality and type of medical service which a community receives will be in the last instance determined by the public." It is significant that the health officers reporting those in favor as well as those opposed to the proposition of the inclusion of treatment under health departments, give it as their opinion that the public overwhelmingly approves of such a set-up.

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Public Health Administration of a Dental Program*

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IN planning the administration of a public health dental program, we must recognize several facts. The difficulty is to adjust the program to meet these facts.

1. The dental health of a vast majority of the people of this country is bad. Adequate statistics have been produced to show dental disease is the most prevalent physical defect. These findings need not be reviewed here.
2. There is an inadequate number of dentists to furnish the care needed today.
3. There would be no reasonable means of financing complete dental care for all economic classes, even though there were enough dentists to render the services.
4. The problem is made still more difficult because of the fact there is no proved "prevention" of dental disease. There is only alleviation. Prevention in dentistry exists only in circumvention of the development of *additional* disease. Death or loss of the tooth is prevented by repair of the diseased condition.

Every public health administrator must at all times bear at least these major facts in mind in establishing a public health dental program. If the administrator is to serve the public and not *special* groups, selected because of certain privileges, or lack of privileges, he will not have met his obligations if he attacks but one phase of the problem. He must consider, as well, the adverse influences brought to bear on other phases as the result of his action.

Public health programs are subdivided into two main categories—educational and service. We attempt to teach people to do things for themselves. That is education. Then, we give to them those things in way of direct service which they could not otherwise secure, or which it would be inconvenient or too expensive to obtain through other channels; or, least creditably of all, we administer services because it is convenient and pleasurable to us as health officers to do so.

In public health dentistry we have engaged in educational programs of undoubted good intention, and unquestionably in many instances with beneficial results. But what, after all, can we teach? The relationship of cleanliness, dental exercise, diet, intercurrent disease, and primary infections, to dental caries is not understood. Great claims have been made for each of these points as being *the* most important, if not the sole factor in the development of disease. We stressed "the clean tooth never decays" idea only to abandon it to take up the "leafy vegetables and milk" thought. We have had thrown at us, and have in turn passed on as educational material, ideas about carbohydrates, about chewing gum, about tonsils, and many other "true causes" of disease of the teeth.

* Read before the Oral Health Group of the American Public Health Association at the Sixty-eighth Annual Meeting in Pittsburgh, Pa., October 18, 1939.

In the end we must admit there is but one thing we can safely teach and still be reasonably within the confines of the truth. We can teach people to go to their dentists, periodically and regularly. We can truthfully teach that the repair of small faults will usually assist in the prevention of bigger faults. We can prove that small sums of money spent on early repair will prevent the need for greater sums for later services. In other words, " see your dentist twice a year " is about all we can safely hope to accomplish.

Much discussion can, and has been, profitably carried on as to the methods of fixing this idea in the minds of our people—children and adults alike. It is not within the scope of this presentation to discuss the relative merits of different educational methods and the different motivating forces that can be stimulated and directed in causing our adult and child population to be desirous of seeing a dentist. The educational technics are quite well established. Suffice it to point out that, if this is to be one of the objectives of a public health dental program, there is nothing in the basic education or training of the dentist or hygienist that fits him to compete with the modern educator in the field of education. Let the dentist point out to the professional educator the truths that are to be taught, and the value of having such facts part of the knowledge of the people—then let the dentist relinquish the task of teaching to those trained to teach. As a rule, the dentist and his staff have no place in the classroom. It is recognized that there is an ever increasing place for educational programs carried out by the dental profession and health department outside the schoolroom.

But, having assumed the necessity for a dental education program, let us look at the results of such endeavor and then determine how extensively we dare to engage in this work.

If we recognize the fact that nearly every person needs dental care, and that there has accumulated a mass of dental defects far beyond our ability to remedy, then it would seem worse than pointless to engage in an ever increasing dental education program aimed at sending all the people to dentists for care for all their needs. This can result only in disaster, save in those fortunate communities with money enough and dentists enough to meet the needs. (We are unacquainted with records that reveal the existence of any such community.) What point is there in drilling into the minds of school children and their parents, in certain rural areas, the need for dental care when there is no dentist available—and when none can be made available? What good can be expected to come from teaching the same point to urban dwellers with the welfare and Work Projects Administration as the sole source of the necessities of life for so many, with no money available for prophylactic or curative medical care of the most urgent kind? We must face the fact that merely education is not enough. It is to be presumed that the saving point in many of our educational programs is that our efforts have been useless. We have said we were teaching when all we were doing was entertaining, or less. To stimulate an increased demand for a scarcity is to raise prices, encourage the development of inferior substitutes, or to add to the social unrest and dissatisfaction already near the danger point. But, to continue an ineffectual program labeled " dental health education " just because it results in none of these undesirable social by-products is not justifiable when there is so much real need and there are too few trained hands to supply the need.

Dental education in our schools and industries, and for our public at large, must go on, of course. The plea is for reasonableness and purposefulness. No

educational program should be instituted or continued until there is a definite provision for meeting the created demands for service.

When the public health administrator looks into the dental health problem and sees the vast amount of work to be done, particularly for the totally indigent and those who may be termed as dentally indigent, he is tempted to resort to the clinic device to aid in solution. This may be a partial solution to the problem, but it is not the complete solution, nor is the operation of a free clinic an unmitigated good. It is unnecessary to discuss the charges that any free clinic is to be condemned because it conditions the thinking of the people so that they expect not only their medical and dental care at governmental expense, but demand their every necessity of life from the same source without repayment.

The difficulties with many clinics is that they have not geared their practices to the real needs of the group served, and they have not intelligently adjusted the service program to a long range plan encompassing the entire community and its needs. Our dentally indigent group is very large, as shown by the various studies undertaken in several fields, but a program directed solely at this group cannot be called public health, but must be admitted to be only one phase of emergency medical relief.

It has been stated that there are dental services available only to sufficient extent to care for the newly developing defects, and that we cannot expect to go beyond this to any great extent with the present staff of practising dentists in this country. This point has been appreciated by many investigators in this field, and has been variously stated. It would seem to be most unwise to attempt to give complete clinic service to this group of indigents. To do so would furnish them a higher standard of care than the rest of the country could possibly secure. Any public medical care must be of a high standard, but it should not furnish a degree of service that is unavailable to those who are not recipients of public attention. This is contrary to basic principles of all relief programs and can lead only to eventual overthrow of the program by those who pay for their own care and are perforce compelled to bear the cost of the relief program as well. The entire relief program, justly or unjustly, is placed in jeopardy when relief clients have more or better than the self-supporting fraction of our population.

Even though a complete free clinic service, that is, a program of treatment of all existing dental defects, were possible and tolerated, such would prove to be unsound from the public health viewpoint. The public health administrator must be concerned with his total population. It is to be doubted if any health officer has enough dentists in the territory he serves. Every dentist withdrawn from private practice and placed in a free clinic, serving but a limited section of the population, tends to accentuate the shortage of dentists available to serve the one-half to three-fourths of the population not eligible for free service. This increases the cost and adds to the accumulation of dental needs in the non-clinic group. Dental services should not be withdrawn from the private practise field to the extent where it would be crippled. Idle or unused hours of private dentists should be the first source of dental services supplying clinic needs. Here is a nice question for the administrator to decide. How far can he go in withdrawing services from a group that has some care, but insufficient, and diverting those services to another group that has greater needs and no care. This is not a theoretical or visionary difficulty. It is real. The ultimate solution can be reached only when answers to similar

problems have been advanced in respect to distribution of food, clothing, culture, luxuries, and wealth itself. It is there in dentistry too, and merits our most careful consideration.

The clinic must adjust its procedures in accordance with fixed policies. It is for the health administrator, to the best of his limited ability, to say how much service shall be given and to whom. It would appear wise to conduct only a public dental care program of sufficient scope to treat the new defects in the group served. Only new defects, new cavities, new dental disease conditions should be considered eligible for clinic care. The clinic must be prepared to ignore the overwhelming mass of accumulated defects, allowing them to go their way, to be eliminated only as time itself operates. This is a difficult method to follow.

The classroom and the clinic are not the only forces available to the public health administrator for improving dental health. There are all the practising dentists themselves. They not only can, but even must, do their share. It is the obligation of the health officer to bring them into the picture. It is not sufficient for him to carry on an educational program teaching people to go to their dentists for early care and attention. It is not sufficient for him to supply a minimum service for those who have no money to carry out his teachings. In addition, those who have services to sell must be able to give greater service in response to the demand stimulated. Children's dentistry with its early repair work is spoken of almost as a specialty when it should be the basis of practice. Again, let me point out that the dentists of the country are not able to treat all the dental faults existing in our people. There are not enough dentists and there is too much disease.

It is not feasible to create an appreciable increase in the number of dentists or even dental assistants. It is not safe to dally with the idea that small fillings and minor repairs could be done by persons given very short term training in these special technics without bothering to have them meet the demands of professional standards. This would not seem to be the wisest solution of this phase of the problem.

More dentists might well be given not only the skills required in handling the child patient and his problems, but more dentists can be imbued with the same philosophy that we have advanced for the operation of the dental clinic. The problem of the people as a whole should be appreciated in the private offices. Private practitioners of dentistry might well devote an ever increasing amount of time to the newly developing defects in their clients and, if need be, give proportionately less time to the repair of what might be called chronic dental ill health. How much better off in years to come we would be if the dentist would treat ten or twenty new defects in place of doing one restoration operation, and if he were to keep these early defects from needing restorations. But, of course, here is an impossible situation, for by and large the persons needing and securing the more elaborate care have reached the more productive years of life and can afford to pay more for their services. The dentist need not give up those services that provide him with his income, but he can appreciate that this same individual who has reached the period of life where he can afford to pay well for services, also has a family that can well profit by more extensive early care. This adult patient affords an ever present opportunity to carry on the best type of educational program for early care for others. But, it is not too much to hope that some change in emphasis can be secured, that more stress can be placed on early treatment, that the dentist will actually be glad to have the little filling to do, that the professional honors will be bestowed

on those who have saved their patients' teeth and money. There is ample opportunity for the dentists to devote more attention to early treatments. This can be added to the program and thus materially augment their income. It has been repeatedly shown that children's dentistry does pay the dentist good returns.

Here is a direct challenge to the health officer. Let him work with the dentists. Let him, by all the ways at his command, teach the dentists the importance to the national health of bending his efforts to caring for the annual increment of new dental disease, and giving but secondary consideration to the accumulated mass of conditions needing attention. Such a program can be worked out with financial profit to the practitioner, and glory to the health administrator.

In several localities programs have been developed aimed at giving each private dentist a definite part in the total public health plan. Continued education programs have been arranged aimed at refreshing the dentists' interest in and ability to care for the early defects, particularly in children. These seem to be meeting with success.

The public health administrator in planning his dental program cannot hope to alter the picture radically in any short period of time. The idea is advanced that the program might well embrace three phases:

1. Education of the public as to the value of early and continuously repeated visits to the dentist
2. Limited dental clinic care
3. Redirection of at least some of the work of the private dentists

These three phases of the program should be operated so as to secure the greatest amount of attention to the *new* defect, admitting that the mass of dental disease accumulated as the result of neglect in the past presents a problem for which we have no solution, and hoping that sufficient care aimed at the annual increment of defects will prevent the future piling up of unmanageable surpluses of work to be done.

The dental profession has a tremendous rôle to play in any public health program. Over and over again it has been shown that not only can the dentists be interested in the public health aspects of their own field of operation, but when such interest is stimulated, a still greater good results. The dentists then become interested in and a part of the entire public health movement and thus the public health administrator has added to his staff a new group of protagonists working for advancement in health along all fronts.

Controlling a Malaria Epidemic at Maxine, Ala.

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IN May, 1939, Dr. C. E. Elgin, Camp Physician for the Praco and Maxine Mines, owned and operated by the Alabama By-Products Corporation, conferred with the Jefferson County Health Department and reported that an outbreak of malarial fever had occurred in the old Maxine Camp in epidemic proportions. He also stated that a small outbreak had occurred in this area the latter part of the malaria mosquito breeding season in 1938.

Immediately upon receipt of this report an investigation was made by the Sanitary Engineer of the Department.

HISTORICAL

Maxine is a small village or camp built for the abandoned Maxine Coal Mine now used to house some of the miners and workers at the Praco coal mine three miles away. It is located in the western part of Jefferson County on the Locust Fork of the Warrior River which was impounded by the construction of locks by the United States Engineers to aid navigation. The first locks were constructed in 1915 and soon thereafter an epidemic of malaria resulted. This epidemic became very serious and the U. S. Public Health Service sent three men from Washington to make an investigation—Dr. Henry Rose Carter, Dr. T. H. D. Griffith, and J. A. A. Le Prince, who are well known for their work in malaria control—and during their investigation and study much of the fundamental work on methods for the control of malarial mosquitoes on impounded reservoirs was developed. Observations and studies made at this time materially affected the formulation of regulations for the control of malaria on impounded waters which were adopted in Alabama in 1927. Since 1915, malaria has been more or less endemic in the area as a result of this impoundage.

In 1935, a contract was let by the War Department to raise the dam at Lock 17 12 feet in order to secure a deeper channel for navigation. This is the dam about 30 miles below Maxine. The regulations governing the impounding of water as passed by the State Department of Public Health also apply to raising the water level of an existing project. Representatives of the State Department of Public Health conferred with the War Department and very good coöperation was obtained in clearing the new areas to be flooded and preparing the reservoir for impoundage which took place on November 20, 1937. There were, however, a few places on the lake that were not prepared thoroughly, and the Coal Creek area, or branch, which flows through Maxine, was one of these.

The Coal Creek area covers about 40 acres and the water varies in depth from a few inches to several feet. The entire area has grown up with vegeta-

tion of various kinds to such an extent it is almost impossible to navigate a small flat bottom boat or even wade through it. Dippings made in the area with catches of adult mosquitoes in the vicinity definitely proved this to be the chief breeding place of the malaria transmitting mosquito (*Anopheles quadrimaculatus*) in the Maxine area.

In anticipation of an increase in malaria around Bankhead Lake after the raising of the water level the State Department of Public Health in cooperation with the county health departments bordering on the lake made a "base line" blood survey in 1937 in the one mile area, prior to the new impoundage. This was in the form of a fifth family survey; that is thick film blood smears were taken from all the members of every fifth family in the area and examined by the laboratory. In Jefferson County there were 478 blood smears taken and only 2, or 0.4 per cent, were found positive for malaria parasites. This survey indicated the presence of malaria and the hazard that could develop if proper precaution and adequate control measures were not taken.

During the first summer (1938) after impoundage there were not many cases of malaria reported from any area on the lake until the early fall, when there was a sharp increase in the number of cases, and Dr. Elgin confirmed this general condition by reporting that he had treated 144 cases in the Maxine area that had a population of approximately 240. This information, however, was not received at the Health Department until he asked for help in May, 1939. (These cases were diagnosed by Dr. Elgin and in most instances were not confirmed by blood smears.)

Control operation by spraying parts of the shoreline with a mixture of black oil and kerosene oil were carried out during the mosquito season of 1938, but were inadequate due to the lack of sufficient appropriations and equipment. This was pointed out to the War Department, and provisions were made by that department to increase this work the next year by additional equipment and personnel and by placing in charge a man who had had some special training in this type of work. To carry out control operations properly, funds were requested and made available to the War Department, and it appeared that malaria transmission would be at a minimum during the 1939 season. Control operations were begun in the first part of May, 1939, under the general direction of a Junior Engineer employed by the War Department and the State Department of Public Health acting in a consultatory capacity.

As a part of the investigation made by the Jefferson County Health Department, Dr. Elgin made a survey of his records and patients under his care at the time to determine exactly the number of cases of malaria in the Maxine area. He stated that there were 133 cases, or 55 per cent of the 240 people within one mile of the Coal Creek arm of Bankhead Lake.

Soon thereafter, another survey was made by the Jefferson County Health Department. A sketch map was prepared and every house visited by a sanitation officer and nurse, and blood smears were taken for laboratory examination.

Summary of the results of this survey:

Houses surveyed	41
People in houses surveyed	176
People refusing to have smear made	8
People not at home	3
Slides positive for malaria parasites	12
Percentage of population with positive blood	7.3

All of the positive slides were of the tertian type malaria.

It is believed by all persons familiar with the epidemic that the number of

positive slides would have been much higher except for the fact that Dr. Elgin had been treating all suspected cases with quinine and atabrin. It was also believed that a very large percentage of the cases were relapses from the year before, but Dr. Elgin was convinced that some had received their infection in May, 1939.

On June 2, 1939, an inspection was made of the adult mosquito catching station established by the War Department near the back water on Coal Creek, and 35 female *Anopheles quadrimaculatus* were caught and identified. Upon inquiring among the natives in the area it was learned that the Coal Creek area had been oiled on two occasions prior to this inspection by the malaria control forces of the War Department, also that the War Department had given orders to the malaria control forces to bring all equipment to Lock 17 as this work was to be discontinued.

With 133 cases of malaria reported, an unusually large number of adult *Anopheles quadrimaculatus* mosquitoes already "on the wing" and control operation discontinued, a very serious condition faced the people of this vicinity.

As the discontinuance order was only a rumor at the time of this investigation, the State Department of Public Health was notified immediately to call the matter to their attention. The order was confirmed by a letter from the War Department written to Dr. J. N. Baker, State Health Officer, under the date of June 2, 1939. Quoting in part from this letter:

> As a result of conflicting interests of the Department of Conservation and the Department of Public Health, the Engineering Department has authorized the discontinuance of mosquito control operation until such time as a program which will be satisfactory to all interests has been adopted.

This action made the problem much more complex, as it involved matters of policy for the entire state on malaria control, conservation activities, relation of state laws to federal projects, etc., and it was obvious that time would be needed to correct certain misunderstandings. In the meantime a serious emergency existed from a public health point of view, and time was an important factor.

The details of the controversy will not be discussed in this paper, but the matter was settled and oiling operations were resumed on the lake by the War Department about June 28, 1939, and were greatly intensified in an effort to overcome conditions that had developed during the 30 days of inactivity.

CONTROL MEASURES

The seriousness of the situation was outlined to the officials of the Alabama By-Products Corporation. This company owns the village, and a majority of the people living in Maxine were employees of the company. The Superintendent of the Praco Mines also pointed out that approximately 10 per cent of the miners from this area were not at work due to malaria, and it was materially affecting production.

Consideration was given to the company's carrying on temporary control measures on the lake, but since malaria was already so prevalent a prophylactic program for all persons in the Maxine area was decided on in combination with treatment of all cases by the camp physician.

Atabrin was used as the prophylactic agent and was supplied jointly by the Alabama By-Products Company and the State Department of Public Health. It was administered by nurses from the Jefferson County Health Department. To assure uniform administration the drug was given and taken in the presence of one of the nurses. There were of course exceptions to this as some were not at home at the time of

the nurse's visit, in which case the atabrin was left at the home and on the next visit they were asked whether or not it was taken.

The atabrin was given on Mondays and Thursdays of each week beginning on June 15 and ending on September 7. The dosage of atabrin was varied to meet the requirements of different age groups in accordance with recommendations made by Dr. D. G. Gill of the State Department of Public Health.

Children from 1 to 4 years received 0.05 gm. twice weekly
5 to 8 years received 0.1 gm. twice weekly
9 to 14 years received 0.15 gm. twice weekly
15 years and over received 0.2 gm. twice weekly

The number of doses received per person was 22 and the total amount of atabrin taken per adult was 4.4 gm. If the nurse noticed any symptom of malaria in any of the group she immediately called this to the attention of Dr. Elgin and the patient remained under his care until the symptom disappeared and then they resumed the prophylactic treatment.

To determine the effectiveness of this program another blood parasite survey was made on July 27. One hundred and ninety-one slides were taken and examined and no positives were found in the prophylactic group. The number of persons having clinical symptoms and receiving additional medical treatment at this time was 12 as compared to 133 cases in the early spring.

Control operations were resumed on Bankhead Lake about June 28, 1939, and in an effort to give as much relief to the Maxine area as possible, the Coal Creek area was sprayed every 5 days instead of the routine procedure of once a week. Even with this special treatment the number of female *Anopheles quadrimaculatus* caught each week in the catching station at Maxine was very high throughout the mosquito season.

The War Department established 31 regular catching stations around Bankhead Lake that were inspected once each week to determine the effectiveness of this control operation. Complete data on the number of mosquitoes caught at each of the stations are not available at this time, but Table 1 indicates the lack of control obtained in the Maxine area and compares it to the effectiveness of control in other areas on the lake.

From this table it can be seen that a consistent decrease in the number of mosquitoes was not obtained until around the first of September, also that the station at Maxine (11) was by far the worst place on the lake. The average for this station was 19.6 times higher than the average for the lake and was 5.6 times higher than the average count of the next highest counts of the other stations.

The prophylactic program was discontinued September 7, 1939, and on October 5, 1939, another blood parasite survey was made. A month was allowed to elapse between the last prophylactic treatment and the survey, so that an indication of the amount of infection could be obtained and the effect of the atabrin on the parasites would be gone.

Due to greatly increased activities at the Praco Mine, there were a number of people this survey was unable to reach, but the following results were obtained:

People living in houses surveyed....	221
People absent at time of survey.....	61
Number refusing to have smear made	7
Number of blood smears made.....	153
Number of smears positive for malaria parasites	4
Percentage of blood smears positive	2.6%

Careful records were kept as to the atabrin taken by each person in the area. These show that of the 4 carriers of malaria parasites found by the survey, 3 took every treatment offered.

TABLE 1

Date	*Number Female Anopheles Quadrimaculatus at Station 11* *	*Highest Number Female Anopheles Quadrimaculatus Caught at Any Other Station During Week*	*Average Number Female Anopheles Quadrimaculatus for the Week at All Stations*
7- 1-39	411	42 (20)†	22.2
7- 8-39	473	60 (20)	25.5
7-15-39	426	52 (8)	24.7
7-22-39	284	73 (9)	21.16
7-29-39	110	57 (9)	11.45
8- 5-39	135	32 (20)	12.6
8-12-39	84	37 (9)	8.5
8-19-39	71	24 (6)	7.04
8-26-39	116	17 (9)	6.74
9- 2-39	105	9 (10)	5.23
9- 9-39	96	15 (6)	6.06
9-16-39	89	14 (6)	5.61
9-23-39	80	10 (6)	5.07
9-30-39	62	9 (6)	4.45
10- 7-39	45	6 (7)	2.87
10-14-39	13	3 (6) (7)	1.20
Total	2,587	457	
Average	162.5	29.0	8.3

* Station 11 was the adult mosquito catching station at Maxine, Ala.
† Numbers in parentheses are the station numbers where these counts were obtained.

One discontinued taking atebrin August 14, 1939. None of these 4 cases gave a positive blood in either of the other two surveys. They were referred to Dr. Elgin for special treatment, and additional blood smears will be taken upon the completion of this treatment.

It is now planned to make a complete blood parasite survey in the area in the early spring of 1940 in order to begin treatment of any relapse cases before the malaria transmission season begins.

DISCUSSION

The use of drugs in controlling malaria transmission in the Maxine area on Bankhead Lake was put into effect on a practical basis during the summer of 1939. From previous work by the Alabama State Department of Public Health and others it was believed that this type of control would be the most effective under the circumstances found in this area.

This work was not conducted with the view of doing research, but all activities were directed to control an epidemic of malaria and give relief to the persons involved. From the results obtained it is believed that this end was accomplished.

"Ropiness" in Tea Caused by Aerobacter aerogenes in a Water Supply

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A SAMPLE of tea submitted to this laboratory showed "ropiness." The practice of the family who sent it was to prepare a fairly large quantity at a time—usually one day's supply. The tea was kept at room temperature until used, when it was poured into glasses containing ice.

A few weeks earlier it was noted that upon standing, the tea became "ropy" or "slimy." The same result was obtained with different brands of tea. However, tea made with water from another supply did not become "ropy." The tea, when touched with an inoculating needle would "string out" in the same manner as "ropy" milk.

EXPERIMENTAL

Stained preparations from the tea showed the presence of Gram-negative, encapsulated bacilli.

Tea was prepared in the usual manner, 100 cc. portions placed in flasks, sterilized, then inoculated with the "ropy" tea and incubated at room temperature. The tea became "ropy."

The "ropy" tea was diluted with sterile water and plates of nutrient agar were poured. After incubation, the predominant type of colony was thick, white, moist, and "stringy" when touched with an inoculating needle. The colony consisted of Gram-negative bacilli.

Several representative colonies were transferred to agar slants, and after stained preparations had shown the slants to be pure cultures, various media were inoculated for identification. These organisms were identified from their biochemical reactions as *Aerobacter aerogenes.* When sterile tea was inoculated with these cultures, it became "ropy."

Since the experiment had proved that "ropiness" in the tea was due to *Aerobacter aerogenes,* and could be reproduced in the laboratory from pure cultures isolated from the tea, we were interested in finding the source of the organisms.

The water system consists of a drilled well, approximately 200 feet deep, cased and fairly well protected against surface pollution; an elevated (approximately 15 feet) galvanized iron covered storage tank; and a piping system serving the residence and various poultry houses. Pipe sizes vary from ¼" to ½".

The fixtures served by the piping system consist of the kitchen tap, a solar heater located on the roof of the house, a "desert cooler," a shower bath, a number of hose bibs, and approximately twelve chicken drinking troughs equipped with float controlled valves. There were three valves well below the rim of the troughs, leaking so much that they were submerged.

Bacteriological examination of a

sample of water from the well showed bacteria of the coli-aerogenes group in three of five 10 cc. portions. A sample of water from a tap in the house showed the coli-aerogenes group in one 1 cc. portion and five 10 cc. portions.

Sterile tea was inoculated with water from the well and from the kitchen tap. The tea inoculated with the sample from the kitchen tap became "ropy" while that inoculated from the well did not.

The two water samples were plated out on nutrient agar and "stringy" colonies, similar to those from the original "ropy" tea, developed on the plates inoculated with water from the kitchen tap, but not in those inoculated with the well water.

These colonies from the kitchen tap, in pure culture, produced "ropiness" in sterile tea, and were subsequently identified as *Aerobacter aerogenes*.

It appeared therefore, that the organisms were not present in the water from the well, but were entering the water supply from some other source.

A sample of water from a chicken trough showed more than 5,000,000 bacteria per cc., and the presence of large numbers of the coli-aerogenes group. When sterile tea was inoculated with this water, "ropiness" did not develop (presumably due to over growth by other organisms), but when plated out on nutrient agar, *Aerobacter aerogenes* were isolated, and when these cultures were inoculated into sterile tea, "ropiness" resulted.

The well and tank were chlorinated. Subsequent examinations failed to show bacteria of the coli-aerogenes group. Sterile tea, inoculated with water from the kitchen tap did not become "ropy," and for a time there was no further difficulty.

After a few weeks, the "ropiness" reappeared in the tea. Examinations of samples of water from the well and tank did not show bacteria of the coli-aerogenes group. It appeared that the bacteria were entering the system at some point after leaving the tank. Two points were most probable ports of entry; the window cooler and the chicken troughs. In the former, there was the possibility that dust-borne bacteria might lodge in the moist evaporation column (excelsior) and develop there, but inspection revealed that this possibility was remote.

The chicken troughs were then filled with water so that the valves were automatically closed and fluorescin added. Several taps were opened and in a short time water from these showed the presence of dye, showing that the organisms had entered the water supply by back siphonage from the chicken troughs. The valves were elevated above the rim of the troughs, the system was chlorinated, and there have been no further complaints of "ropiness" of tea.

Apparently, this strain of *Aerobacter aerogenes* was fairly resistant to heat. In making the tea, the water was brought to a boil, and poured over the tea. Although these organisms might be heat resistant, due to the presence of capsules, it seemed probable that the tea had been inoculated by rinsing some of the containers or utensils with unboiled water from the tap. In our laboratory, these organisms, when inoculated into hot tea (just after removal from the autoclave, held in a 56° C. water bath for 4 hours, and incubated at room temperature), remained viable, and produced "ropiness" of the tea.

Although members of the coli-aerogenes group have been incriminated in "ropiness" of foods, particularly dairy products, to our knowledge, they have never been associated with "ropiness" of tea.

SUMMARY

"Ropiness" in tea was found to be caused by *Aerobacter aerogenes*.

These bacteria were isolated from the tea and from the water supply.

Pure cultures of these organisms produced " ropiness " in sterile tea.

Investigations showed that these organisms were entering the water supply by back-syphonage from a watering trough for chickens.

Chlorination of the water supply and elimination of cross-connections terminated the " ropiness " of tea prepared from the supply.

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Laboratory Aspects of Chancroid, Granuloma Inguinale and Lymphogranuloma Venereum*†

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THE increasing importance of the well known venereal diseases, syphilis and gonorrhea, has been repeatedly stressed during the past few years. It must be borne in mind that there are several other diseases of venereal origin whose importance can no longer be minimized. First, because they are communicable, they may be crippling to the patient, they may entail long hospitalization, and in any case interfere with employment, thus entailing economic loss. Second, many of them often simulate syphilis in their clinical manifestations thus making diagnosis uncertain, and frequently, as has been our observation, erroneous. This results in waste of drugs, expense and lost time to the patient. To us it is clear that any adequate and efficient program dealing with the control of venereal disease, as it is usually implied, must of necessity take into consideration these so-called "newer venereal diseases." The health officer and clinician must be acquainted with the fact that certain laboratory tests are available to aid him; and the laboratory should recognize that it can undertake certain procedures, and might assume others, which will be of great service to the clinician.

The term "newer venereal diseases" is perhaps in some respects a misnomer, but it serves to group a triad of clinical entities, namely, chancroid, granuloma inguinale, and lymphogranuloma venereum. All three of them, and in addition syphilis itself, may have a superimposed infection of fuso-spirochetosis which adds to further confusion. And to confuse the picture further, the patient may be infected with more than one of them at the same time, syphilis included.

Until comparatively recent times, the laboratory diagnosis in these diseases has been as difficult as the clinical differentiation, because of the peculiarities of the etiological agents: one is very difficult to cultivate, one has so far defied cultivation; and one is a filtrable virus, with very limited cultivability as yet. Let us then consider each of them.

CHANCROID

The organism associated with this disease was first recognized by Ducrey, and hence bears his name. Because of difficulties encountered, however, he never obtained it in pure culture, and it was 2 years before this was accomplished. Since then, studies of this organism appeared to warrant placing it

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in the genus *Hemophilus*. Without going into detail, I would like to express doubts concerning the advisability of this classification. While it is true that Ducrey's bacillus will not propagate in any media not containing blood, it is also true in our experience that it fails to grow in any medium containing both X factor in the form of hematin, and V factor supplied by either yeast or tomato juice. Such a medium, however, will support luxuriantly the type species, *Hemophilus influenzae.*

Even with blood added to the medium, the growth is not luxuriant when the organism has been first isolated, and, in our experience, surface growth is poor or not at all. It was our failure with the usual methods which gave rise to the adoption of cultivating the organism in soft agar with blood added, or to the procedure of adding blood directly to the surface of agar slants. Each of these methods has been successful in our hands, and the details have been published elsewhere.[6] It should be pointed out that for diagnosis, reliance is best placed upon the culturing of aspirated pus from an unruptured bubo, rather than from the primary sore which is so badly mixed with contaminating organisms that there is no hope of obtaining Ducrey's bacillus in pure culture.

The difficulty encountered in culturing Ducrey's bacillus by older methods of a diagnostic procedure led to the introduction of a skin test. In Europe, this has been known as the Ito-Reenstierna reaction,[1, 2] and the antigen consisted of a suspension of killed organisms. Nicolle and Durand[3] published their work on Ducrey antigens for skin testing, and these later became the commercial Dmelcos vaccine. In England and on the Continent the use of this test has become a routine procedure, but the product has not been commercially available in the United States, and except in a few cases is little known here.

In addition to the bacillary antigens made from stock cultures, diluted bubo pus, heat killed, has been tried as a skin testing antigen in Europe. Cole and Levin[4] were the first in this country to revive the method, and while some success was met with, the antigens were clearly inferior to Dmelcos. It was at about this time that Dr. R. B. Greenblatt working in the clinic of the University of Georgia Medical School became interested in the whole problem of these similar diseases. Bubo pus antigen from chancroid patients was tried and results similar to those of Cole and Levin were obtained. Some imported Dmelcos product proved satisfactory.[5] It was obvious then that if headway was to be made, suitable methods for culturing Ducrey's bacillus and the making of a vaccine must be devised. This has been accomplished, and the methods already published.[6] Some 1,800 skin tests have been done; comparisons with our different strains, Dmelcos vaccine, Hunt's vaccine,[17] and Lederle preparations all indicate that the intracutaneous test is a most valuable aid in the diagnosis of chancroid.[7] Comparison of these strains from various sources also indicates that the Ducrey's bacillus has a homogenous antigenic structure. Personal communications from many sources, and the recent publication of Dulaney[8] confirm our observations as to the value of the skin test when done with bacillary suspensions.

GRANULOMA INGUINALE

What is considered to be the etiological agent in this disease was first described by Donovan,[9] and since then has been known as " Donovan Bodies " —not to be confused with *Leishmania*, however. These bodies are best observed in a smear made from the granulation tissue of the lesions when stained with Wright's or similar blood stains, or in tissue sections as described by

Pund and Greenblatt.[10] In such smears, the organisms are observed to be contained as cytoplasmic inclusions within the large monocytic cells, which is the characteristic cell of the lesion. They occur usually as small rods, sometimes dumbbell shape, and surrounded by a staining periphery which suggests a capsule, and generally in definite clusters within what appears to be a vacuole in the cytoplasm. There may be several such vacuoles in a single monocyte. One gains the impression after observing many specimens that these organisms are actually multiplying within the monocytes, and that it is not the phenomenon of phagocytosis. Unless cells are ruptured there are few "bodies" to be seen outside of the monocytes. Just what are these bodies? Reference to them as a Friedlander's bacillus is the one usually found in the textbooks. What they are I cannot say, but would like to deny emphatically that they are Friedlander's bacillus or any other usual run of bacteria, and I do so on these grounds:

1. Almost without exception, the patient presenting himself with this disease has a raw, granulating lesion which is highly secondarily infected, and, owing to its location, Friendander's bacillus is a common contaminant.

2. The association with Friendander's bacillus is undoubtedly because of the capsule common to each. It should be pointed out, however, that if the apparent appendage possessed by the Donovan Body is a capsule, it cannot be demonstrated by the usual bacterial capsule staining methods, although Wright's stain or silver impregnation brings it out.

3. No one as yet has succeeded in reproducing the disease in humans with any of the bacterial types cultured from the lesions.

4. We have been fortunate in having two patients presenting themselves with clean, *unruptured* buboes. Smears from aspirated pus showed the presence of innumerable Donovan Bodies, and no other type of organism. Cultivation of this material on all sorts of media, aerobically and anaerobically, gave no growth. Small animal inoculations were negative. No growth was obtained on embryo chick membranes.[11] Intracutaneous injection of this material into volunteers however, reproduced the lesion of pseudo bubo with Donovan Bodies within the characteristic pathognomonic cell. These bodies could not be cultivated, nor was any other organism grown out. These findings have just been confirmed from a similar unruptured bubo reported from Duke University.[12]

5. Friedlander's bacillus is easily cultured on all media, is pathogenic for small laboratory animals, and grows luxuriantly on chick embryo membranes, killing the embryos overnight. More work will have to be done before this microörganism can be classified.

LYMPHOGRANULOMA VENEREUM

Levaditti[13] established the fact that this infection is caused by a filtrable virus. The further interesting observation was made by Frei[14] in that diluted bubo pus, heat killed, could be utilized as a skin testing agent for diagnosing the disease. The Frei test has now become widespread in use, and is accepted as the most satisfactory method for establishing a diagnosis. The one drawback to the method is the inadequate amount of material outside of hospital clinics—and even here there may be a shortage—for the preparation of the antigen. Fortunately for us it has been quite abundant, and we have been able to supply other clinics. This limitation of Frei antigen has led to the introduction of an antigen by Grace and Suskind[15] made from brains of mice infected with a passage virus. This is now commercially available, but so expensive that its use as a routine test

is prohibitive, *and a routine test it should be.*

There are reports that mouse brain antigen is inferior to pus antigen in accuracy, so we may be obliged to wait additional appraisal as to the value of this product.* We have repeatedly tried, and failed, to infect white mice with different strains of virus from bubo material, which might indicate that this animal is not best suited to "takes." Likewise have we failed to grow the virus on chick membranes,[16] which we felt might be a method for obtaining a cheap and unlimited supply of antigen.

What is the rôle of the diagnostic laboratory as an aid in the recognition of these diseases? Perhaps one should differentiate between that of the hospital and that of a state or municipal health department. Let us consider the former first. It is my conviction that the laboratory of a hospital purporting to have a venereal disease control clinic should be equipped to culture Ducrey's bacillus from bubo pus and to make skin testing antigen from stock cultures. It should be able to make a satisfactory diagnosis of smears for Donovan Bodies. It should be able to prepare Frei antigen from bubo pus sent in from the clinic. As for the municipal and state laboratories, I believe they should undertake to culture bubo pus sent in for Ducrey's bacillus. It might be possible to make Ducrey antigen and dispense it to the physicians concerned, or at least to clinics. Or, at small cost the antigen could be purchased from a commercial house. Certainly smears could be examined for Donovan Bodies. As to Frei antigen, the situation is not so easy. Should the mouse brain antigen prove its worth, a general demand might bring down the cost, and this could be supplied to clinics. But until some of these measures are more generally applied, there will continue to exist the confusion now present in this field of venereal disease control.

* Our recent data indicate that mouse brain antigen (Lederle) gives results similar to pus antigen.

SUMMARY

The rôle of the laboratory is pointed out as an essential aid in the diagnosis of chancroid, granuloma inguinale, and lymphogranuloma venereum. It is suggested that state, municipal, and hospital laboratories undertake such a service as an aid to the clinician in the differentiation of these diseases.

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South Carolina Birth Registration Campaign*

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IT was evident that birth registration in South Carolina was by no means complete. The State Board of Health, therefore, after consultation with the U. S. Bureau of Vital Statistics, began plans for a birth registration campaign in the latter part of 1938. The campaign ended the early part of March, 1939.

At the inception of the campaign we had three things in mind: (1) education of the public as to the importance of birth registration; (2) bringing about closer coöperation between state and local health officers, state and local registrars, and the State Board of Health with the general public; (3) testing the completeness of birth registration for the calendar year 1938.

AREA INVOLVED

Upon a survey of the possibilities and the limitations of the proposed campaign it was realized that we could not check births in the whole state. Consequently, 11 counties were chosen in which the campaign was to be intensively carried on. For the remaining 35 counties in the state we planned to distribute certain publicity material through the local health officers, local registrars, and any others who would coöperate. The limitations were lack of time and lack of funds, because we could only obtain the assistance proffered for a limited time, and our legislature had provided less funds for vital statistics than for the previous year. We found that these 11 counties represented about 30 per cent of the state's population and about the same proportion of reported births; consequently we felt that we had a fair sample with which to work.

PLAN

It was decided that this work could best be carried on by enlisting the coöperation of local citizens in groups of 15 to 25. These citizens were members of such groups as farm women's groups, agricultural agents, American Legion, local boards of education, county health departments, and business women's groups. They were chosen after consultation with the state heads of these groups, and functioned under the direction of a chairman who was one of the group. To assist these committees we arranged some publicity material consisting of posters for placing in public places, such as post offices, theaters, churches, and schools, suggestions for talks, "Why Register" folders, sample test cards, sample birth certificates, sample birth notifications, newspaper articles, and a guide that was gotten up for the immediate assistance of the committees. The plan adopted was to ask the committees to use all of this publicity material through their own efforts, calling on those in the cen-

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tral offices only when they themselves were unable to obtain the desired results. It was further arranged through the Postmaster General to distribute the test cards by city and rural letter carriers on a certain date. This distribution was to be supplemented by assistance of a committee and other local prominent citizens.

PROCEDURE

After the committees had been formed and chairmen selected, representatives of the federal and state bureaus of vital statistics met with them, explained the purpose of the campaign, the duties of the committees, and went over with them the publicity material provided. In all of the counties the local health departments were most coöperative, particularly the nurses. In some cases the nurses acted as advisers to the committee while in others they not only acted in this capacity but actually served as members or chairmen of these committees. For the most part, however, it was found desirable simply to request the nurses to advise rather than serve on the committees.

The publicity material was distributed through committees and through local registrars, health departments, and ministers. Talks were made by these same groups explaining the purpose of the campaign and the importance of birth registration. The cards when received were filled out by each head of a family where a baby had been born in the last 12 months. As might be expected, however, a number of cards were filled out for those born in other years and for persons who did not reside in the 11 counties tested. These cards were returned to the Bureau in Washington where they were sent to the State Board of Health for checking. The results of the check are seen in Table 1.

RESULTS

The table referred to shows that birth registration was only about 75 per cent complete for the year 1938. We realized that our birth registration was by no means complete, but we hardly expected it to be so low. Since the 11 counties chosen were typical of the sections of the state in which they were located we believe that the results would apply to the entire state. There are variations in completeness of registration in the several counties, and from

TABLE 1

Results of the Card Test

Counties	Total				White				Colored				Race Unspecified
	No. Cards	F	NF	Pct.	No. Cards	F	NF	Pct.	No. Cards	F	NF	Pct.	NF
Beaufort	215	157	58	73.0	46	43	3	93.5	161	114	47	71.2	8
Chesterfield	225	166	59	73.8	154	120	34	77.9	68	46	22	67.6	3
Colleton	286	226	60	79.0	126	95	31	75.4	153	131	22	85.6	7
Dillon	188	145	43	77.1	90	77	13	85.6	97	68	29	70.1	1
Horry	244	194	50	79.5	198	166	32	83.8	44	28	16	63.6	2
Orangeburg	446	328	118	73.5	160	137	23	85.6	274	191	83	69.7	12
Pickens	307	249	58	81.1	289	235	54	81.3	17	14	3	82.4	1
Richland	497	402	95	80.9	362	301	61	83.1	134	101	33	75.4	1
Saluda	173	71	102	41.0	87	40	47	46.0	85	31	54	36.5	1
Spartanburg	956	701	255	73.3	801	612	189	76.4	146	89	57	61.0	9
York	353	285	68	80.7	254	210	35	85.7	105	75	30	71.4	3
Total 11 Counties	3,890	2,924	966	75.1	2,558	2,036	522	79.6	1,284	888	396	69.2	48
All Other Counties	401	310	91	77.3	302	248	54	82.1	94	62	32	66.0	5
Total	4,291	3,234	1,057	75.4	2,860	2,284	576	79.9	1,378	950	428	68.9	53

F—Card found registered.
NF—Cards not found registered.

our own knowledge this is also true of the communities represented. That gave us a direct indication as to what was to be done and the probable way in which it should be carried out. As a whole the committees functioned well not only as groups but as individuals. The same can be said of local health departments and local registrars in the matter of assisting these committees. The work of ministers was not impressive since it was apparently a matter they felt could not be properly presented from their pulpits. County superintendents of education and school teachers were most coöperative and assisted us in a large way in obtaining results in the campaign. For obvious reasons daily newspapers could only run a few stories about the campaign, but the weekly and bi-weekly papers were glad to run every article we gave them, and in many instances voluntarily wrote much better articles than we could have hoped to do. Our Field Agent assisted in the campaign not only to further our immediate plans in this respect but also to educate local registrars and bring about better coöperation on their part, because they were given excellent reasons for filing all births in their territory.

Some 116,000 cards were distributed. By reference to Table 2 it may be seen how these cards were returned. Those returned represented 32.3 per cent of the reported births for the previous year.

As a final check on the coöperation of the various groups 1,087 questionnaires were sent out, of which 51 per cent were returned in the proportions indicated in Table 3.

TABLE 2

Test Card Percentages of Reported Births and Estimated Births

County	*No. Births Reported, 1938*	*1938 Cards Received*	*Pct.*	*Estimated No. Births, 1938*	*1938 Cards Received*	*Pct.*
Beaufort	461	215	46.6	631	215	34.1
Chesterfield	861	225	26.1	1,167	225	19.3
Colleton	650	286	44.0	823	286	34.8
Dillon	702	188	26.8	911	188	20.6
Horry	1,389	244	17.6	1,747	244	14.0
Orangeburg	1,629	446	27.4	2,216	446	20.1
Pickens	806	307	38.1	994	307	30.9
Richland	1,801	497	27.6	2,226	497	22.3
Saluda	241	173	71.8	588	173	29.4
Spartanburg	2,275	956	42.0	3,104	956	30.8
York	1,231	353	28.7	1,525	353	23.2
Total	12,046	3,890	32.3	16,040	3,890	24.3

TABLE 3

Number and Per cent of Replies to Questionnaires Received from Campaign Participants

	No. of Questionnaires Sent	*Replies*	
		No.	*Per cent*
Committee members	268	109	41
Ministers	337	92	27
Registrars (test counties)	114	82	57
Registrars (non-test counties)	333	236	71
County health departments (non-test counties)	35	31	[illegible]
Total	1,087	550	51

CONCLUSION

Several years ago our clerical staff was very small and, due to the withdrawal of certain assistance, it was necessary to discontinue the sending out of birth notifications. The effect was apparent almost immediately. About 5 years ago a Field Agent was added to

our staff. His first duty was to establish closer coöperation between local and state registrars. He then visited doctors, midwives, and undertakers. At all times he maintained the closest possible contact with local health officers. Let me say, here, that our State Health Officer is also our State Registrar, thus he is especially interested in birth registration. We are fortunate, too, in that the director of county health work is keenly interested in vital statistics. We have, therefore, an ideal arrangement for improving birth registration. Quite recently it has been possible to increase our clerical staff to a point where we can begin to approximate at least the proper functioning of the Bureau of Vital Statistics, both in the central office and in the field.

The campaign was planned to enlist the aid of local registrars, local health officers, and citizens, as well as to interest them in the function of registering births. We frankly told all who took part that we believed we had rather poor registration and urged upon them through talks and through our publicity material the improvement of birth registration. The use of local committees was an experiment because it had not been tried, to our knowledge, in any other place. On the whole, these committees functioned efficiently and displayed marked interest in their work. Both men and women were on these committees, and people from various walks of life composed these groups.

The card test was for only one year due to limitations mentioned. Finally we definitely proved that we had a real problem in birth registration in South Carolina and, to a certain extent, we have learned the points of attack. In our opinion the use of birth notifications is well worth while. We have not stressed the work done in the 35 counties but wish to point out that through the aid of local health departments and local registrars a great deal of publicity material was distributed, and as the result we have had hundreds of requests for verifications of birth records for children born not only in 1938 but in 1939 and also in earlier years. In some instances we received requests for verification of records of whole grades in some of the schools and, of course, we have been able through the campaign to secure many birth certificates for children who have heretofore not had such records placed on file.

We have already partially put into effect measures to improve birth registration and as rapidly as possible we plan to extend this. We do not expect to get 100 per cent birth registration. One reason is that certain of our coastal areas are more or less inaccessible; also we have not yet educated our public to the point where they will demand the registration of births of their children. We have had one indirect aid to birth registration in that industry under the minimum age law has requested in the last 10 months many birth records and, more recently, the school athletic groups are being required to furnish proof of their age. This impresses the parents of these boys and girls as to the importance of birth registration, particularly when such births have not been recorded. In many cases parents voluntarily write us about the birth of younger children, and that has already aided us in filing more birth certificates.

Table 2 shows the percentages which test cards for sample counties formed of the number of births reported in 1938, and of the number of estimated births in 1938. Thus, the total number of cards used for the 11 counties were 32.3 per cent of reported births and 24.3 per cent of estimated births.

The estimated number of births was computed on the basis of results of the test, i.e., results of the test showed registration 24.9 per cent incomplete; therefore, the number of births reported was increased by that percentage.

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WAR AND PUBLIC HEALTH

ONE finds it difficult to write these days without referring to the war, or bringing in some situation for which the war is responsible. To consider England alone, the evacuation of several hundred thousand children from urban areas into rural areas, the billeting, medical care, with the attendant dangers of epidemic disease, the thousands of pregnant women and recent mothers for whom preparations have to be made, the interruption of school work and colleges, including those devoted to the training of medical men, and the hundred and one situations affecting the civilian population entirely apart from the care of the wounded and rehabilitation of the disabled demand attention. If there is anything to be said about war that is good it is that everyone must be on the alert and that it brings out many of the best qualities in human nature. The World War taught us many useful lessons, and in America there was never before such widespread education in proper dieting, physical care, vaccination against smallpox and typhoid fever, and all other things that make for good health.

Our foreign journals are filled with material affecting the civilian population as well as plans for the army.[1] Notable are the collection and storage of blood for transfusion, the typing of soldiers in every country to avoid delay when transfusion is needed, the study of the neuroses produced by war, and the renewed attention to proper feeding and the importance of nutrition in wartime.

The first thought is apt to be the care of men in the field, but from every standpoint the care of the civilians during war is of paramount importance, especially prevention of epidemic diseases in order to facilitate release of doctors for service in the army. Such thoughts are agitating medical men in the countries at war, and in some advantage is being taken of the mental attitude which at such times is favorable to acceptance of government regulation concerning what is considered good for them and their children. Generally medical discoveries are far ahead of their application, or, as it has been expressed, ". . . the social impact of medical discovery in the field of prevention takes so long to fructify."[2] A striking example is the prevention of diphtheria which is scientifically so well under control. In the French Army by the end of 1938, 800,000 troops had been vaccinated, and it is stated by Ramon that clinical diphtheria is disappearing from

the army, though the civilian population is apathetic in the matter of immunization, a condition we find in practically all countries. We have also the example of Hamilton, Ontario, with 150,000 inhabitants in which no death from diphtheria has occurred for 10 years, and no case of diphtheria has been seen for 7 years. In Toronto, with 650,000 people, 104,000 infants have been immunized and the incidence of diphtheria from 1930 to 1934 fell from 164 to 3.5 per 100,000, and in 1936 there were only two deaths. In New York City, in 1924, there were some 10,000 cases of diphtheria and 700 deaths, but in 1936 there were only 1,143 cases and 35 deaths, or 0.47 per 100,000, and in 1938, there were only 163 cases reported. From Chicago we have a similar story. In 1939, 32 cities in the United States, with an aggregate population of more than 5 millions, had no death from diphtheria; one has gone 6 years without a death; two, 5 years; two, 4 years; and five, 3 years. With such records how can we explain the attitude of some most enlightened countries—England, for example—where Chester, apparently the best immunized city in that country, has only 45 per cent of the children vaccinated, and in London, the percentage of protected children drops to 5.4?

In England there were some 60,000 cases of diphtheria, with 3,000 deaths a year. It ranks 7th among the causes of mortality during the first two years of life, and from 4 to 11 years is the principle cause of death. In 1910 the incidence per 100,000 in population was 133 and the mortality under 15 years was 384; in 1937 the corresponding figures were 149 and 31.[3]

We cannot but feel pride in knowing that America occupies one of the best positions in respect to diphtheria of any country of the world, owing largely to the energy of the late Dr. William H. Park, who said "The control of diphtheria by specific treatment and specific prophylactic immunization is one of the most gratifying victories of bacteriology."[4] He was prompt always to recognize and test all discoveries. To Ramon,[5] more than to any other single man, we probably owe the success of modern immunization against diphtheria.

During the World War measles caused a terrific number of deaths, principally in our southern camps at which the recruits were largely rural young men who had not been exposed to crowds with the consequent immunization. The protection of contacts with convalescent serum or adult serum has been recognized as efficient for a number of years and has been used with the object of moderating the severity of possible attacks of children of poor constitution. There are considerable practical difficulties in collecting and storing such serum and there is no method known for assaying it as to its potency, consequently the method has not been widely practised in adults and can hardly be recommended. Considering the difficulty of transmitting the disease to laboratory animals and carrying it from one to another, as well as our lack of knowledge of the infective agent, we must acknowledge that at present no method can be advised for active prophylaxis.

None have forgotten the ravages of influenza in 1918 and our utter helplessness before this disease. Our knowledge of influenza and its infective agent has increased tremendously since the World War. We now have at least one laboratory animal susceptible to the disease and in which passage can be carried on with regularity. It seems feasible to explore the possibilities of producing active immunization in man. We can protect ferrets to a certain extent by injections of living virus, subcutaneously or intraperitoneally, but they are not rendered immune against the virus administered by the nasal route, which is believed to be the human route of infection. The induction of specific neutralizing antibodies

in the blood serum is possible in man by subcutaneous injection of both active and inactivated virus. Unfortunately, there has been found to be a large number of antigenic types, recovered from various outbreaks. These do not differ so widely from each other as the types of pneumococci, for example, do, yet their multiplicity is at least a problem not yet satisfactorily solved when it comes to the active immunization of large bodies of men. Those who are best fitted to speak, however, seem very hopeful of its solution.

Scarlet fever has become such a mild disease that there does not seem to be good reason for mass immunization, and in only one part of the United States has this been attempted. It has its place apparently in institutional work, especially in protecting nurses who are constantly exposed to the disease. General Hugh S. Cumming has reported to the Office Internationale in Paris some of the reasons why immunization has not progressed in this country, giving, first, the benign character of the malady; second, some question as to the practical value of the method; and third, the difficulties encountered by experimenters and producers through the Dick patent. In England the Ministry of Health has not moved actively in the matter.

Fortunately there is not much need to insist on antityphoid vaccination for civilians. In the Army and Navy it is compulsory. Our water supplies in the United States have greatly improved and typhoid fever is a vanishing disease. The last report[6] shows that both typhoid and paratyphoid fevers had the lowest rate on record.

It would be fine if we could say the same about smallpox, the incidence of which has been increasing in this country since 1930, and there is only one civilized country in the world which has a higher rate than the United States—India. One is almost tempted to wish for an outbreak. In respect to public health in general, and smallpox in particular, the attitude of the public is comparable to that in regard to religion. We must be frightened in order to be good. A real outbreak of virulent smallpox would do more to revive interest in vaccination than the talk of many doctors and sanitarians, but the cost would be not only prohibitive, but appalling. Heaven forbid that we should be called upon to pay the price.

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NATURAL HYPERSENSITIVENESS TO HORSE SERUM

A BOOK review in this *Journal*[1] recently commented favorably on the fact that the author of the book had made it plain that there need not necessarily be a preceding injection of horse serum for the occurrence of anaphylactic shock when a prophylactic or therapeutic dose of horse serum is given.

Probably there is no more widely prevalent misconception in the field of immunology than that the parenteral administration of a horse serum preparation may occasionally be followed by unpleasant consequences, only provided the person has had an earlier dose of the serum—in other words, that the great danger of serious reaction occurs only after a *second* dose of horse serum.

One readily perceives how this erroneous belief has come about; the guinea pig is the animal of choice for experiments on artificial sensitization, and in this species a preceding dose of horse serum is necessary if the dramatic, often fatal, manifestations are to occur. Usually this experiment is demonstrated to medical students and it is but natural that they should carry over mentally the results of the experiment on the animal to the experience with man. The fact is that usually it is the *first* dose of horse serum that gives rise to the serious and even fatal condition which we speak of as "anaphylactic shock." True, a first dose of a horse serum preparation predisposes to allergic manifestations when a second dose is given after the lapse of some days, but these signs and symptoms are in the nature of what is usually spoken of as "serum sickness," vasomotor phenomena, urticaria, arthritic symptoms, even fever.

Rosenau and Anderson, early workers on serum sensitization, specifically pointed out that the serious sequelae of administration of horse serum developed after the first dose of the material; this observation should have served to prevent the development of the erroneous concept, but apparently the striking objective evidence of the laboratory has made more impression on the medical mind than does the prosaic record of human experience.

In deciding whether one should administer a horse serum preparation, the history of a prior injection is of less importance than is the history of allergic response to exposure to horses, or a personal or family history suggesting hypersensitiveness to foreign protein.

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EDUCATIONAL QUALIFICATIONS OF HEALTH OFFICERS

FOR a number of years our Association has had a Committee on Professional Education and a Sub-Committee which devotes its attention to educational qualifications of health officers. While these committees are made up largely of physicians, the membership includes also nurses, engineers, and others who have not had medical education. The doctors all are either professors or administrators —none practitioners.

In October, 1939, a report with recommendation was presented and accepted by the Governing Council, hence represents the stand of the Association as a whole. After outlining the fundamentals in the sciences and humanities the statement is made that a health officer should have completed the courses leading to the degree of Doctor of Medicine from a recognized medical school and, in addition, have had at least one year in an approved general hospital which included a communicable disease service. After this it is recommended that the candidate should have a period of supervised field experience in a well organized department of health, following which there should be at least one full academic year of graduate instruction in public health at a university, and if possible a year in a subordinate position before being put at the head of a department of health.

It is deemed impractical at present to insist on all of these requirements, and some modification is allowed as a temporary measure, especially in the direction of recognizing the value of field experience under competent supervision. Men not holding the medical degree have achieved success as administrative health officers, and again some leeway is allowable in the selection of health officers for positions

where the duties are mainly administrative, provided they have had adequate general and biological education, not less than two academic years of graduate instruction in public health and one or more years of administrative experience in a recognized health organization.

There is an unmistakable trend on the part of governmental officers to insist on the medical degree as a requisite for health officers and it is inadvisable to encourage a candidate for the public health degree to look forward to a career as a health officer unless he possesses also the medical degree.

The first recommendation says positively that candidates for positions as health officers should not only be graduates of approved medical schools, but must also have served at least one year as interns in an approved hospital, in addition to which they must have had not less than one year of graduate instruction leading to a degree in public health in a university. So far as the degree in medicine is concerned, this has always been the feeling of the medical profession, a stand based on sound reason which should not need argument. The next striking feature is that public health is recognized as a profession or, as it were, a higher degree engrafted on medical education. Not so long ago anyone who could place M.D. after his name was considered an authority on hygiene, in spite of the fact that it was a neglected subject in practically all medical schools, even after the advent of bacteriology and its many fundamental discoveries.

When put into effect these recommendations will bring us much in line with the practice in England from which country we have learned so much in the way of public health. Under the Local Government Act of 1933,[1] no man can be appointed a county Medical Officer of Health unless he is a duly qualified medical practitioner and is registered as the holder of a diploma in sanitary science, public health, or state medicine. He cannot engage in private practice or hold any public appointment without the consent of the Minister. No one can be appointed M.O.H. of a borough or urban or rural district unless, in addition to other qualifications, (a) he is a duly qualified medical practitioner; and (b) in the case of a borough or urban or rural district having a population of 50,000 or more, he is also registered as the holder of a diploma in sanitary science, public health, or state medicine. In England, Wales, and Scotland no person may act as a Medical Officer of Health who is not legally qualified to practise medicine, surgery, and midwifery. In addition to being legally qualified as above, the person appointed must either have had three years' experience of the duties of a M.O.H. or have a diploma in Public Health. The Minister of Health has certain powers in the way of making regulations, but essentially the above are the qualifications demanded in that country.

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BOOKS AND REPORTS

Faiths That Healed—*By Ralph H. Major, M.D. New York: Appleton-Century*, 1940. 290 pp. Price, $3.00.

This is a well written and most interesting account of the many manias which have been observed through the ages, in practically all of which medicine and religion have been badly mixed. In the earliest times physicians were priests. Even the highly civilized Greeks believed that disease was sent upon man by gods who had been angered, so the prevention and cure were to be sought by appeasing the gods. Healing was prominent in the early Christian Church, and according to the Bible, the disciples were sent out "to preach the Kingdom of God and to heal the sick." They were given "power and authority over all devils and to cure the sick." That this relationship still exists is shown by the rise of various dogmas and of persons who profess to have healing powers.

Many of the faiths which are so well told of in this book are fairly recent in origin, the healing at Lourdes, for example (1844), which persists in full force at the present day. Some of the "miracles" happened to persons of the highest integrity and amazing intellectual powers—such as Swedenborg—"scholar, scientist, administrator and statesman." His revelations led to the foundation of the Swedenborgian Church. In many there was a queer mixture of religion, superstition, and charlatanry. Some of them went to terrible extremes, among the worst of which we must sadly acknowledge the burning of so-called witches at Salem, in which some of the most cruel practices were not only condoned but instigated by men like Cotton Mather and other ordained ministers of the gospel.

The handling of the material throughout the book is excellent. The various fads are to a certain extent grouped. The book evinces more liberal spirit than is often found in the discussion of fads and follies. The title shows that the author recognizes the cure of certain types of symptoms if not diseases. Diseases or symptoms which are suggestible were cured by persons like Mesmer, Greatrakes, Gassner, and Perkins.

Many miracles of the old days are readily explained — bleeding bread, bloody sweat, certain stigmata, etc. Some cases are puzzling but "just as scientific study has explained many mysteries of the past, so we may expect an explanation in the future of what seems a mystery to-day."

This book should prove a wholesome antidote for those who are inclined to magnify the wisdom of the human race. The author recognizes that "Some of the fairest pages in the history of human kindness and charity have been written by devoted priests and sisters of the Church. Some of the blackest pages, likewise, by pious, but misguided zealots who mistook disease for the Devil." The story of John Alexander Dowie, who flourished extraordinarily during the time of many of those now living, should warn us that we are not even yet overwise or altogether enlightened. Neither science nor religion has been entirely efficient as antidote against superstition and barbarity.

The book is well illustrated and gotten up. On page 105, the name of the clergyman who fasted should be Israel

Harding Noe. It is written for the laity but can be read with advantage by professional men of all callings.

MAZŸCK P. RAVENEL

Fleas of Eastern United States—*By Irving Fox. Ames, Iowa: Department of Zoölogy and Entomology, Iowa State College,* 1940. 191 pp. Price, $3.00.

This is primarily a taxonomic treatise on the fleas of Eastern United States, including keys for identification, detailed descriptions of the various species, and their known distribution. Reference is made in the preface to the tremendous medical importance of fleas and the increasing concern about their implication in the transmission of diseases other than bubonic plague. The author might well have greatly increased the usefulness of the book by including a brief discussion of bubonic plague, its occurrence in this country, and the part fleas play in its spread, as well as of the other human diseases with which fleas are implicated.

The introduction gives a concise but clear discussion on the collecting, preparing, and mounting of fleas for study, together with the morphology, terminology, life history, and a too brief statement on the control of fleas.

In the taxonomic discussion the author first divides the order Siphonaptera into the two suborders Integricipita and Fracticipita, and then breaks down each suborder into families, genera, and species. In all, 55 species, falling into 5 families comprising 33 genera known to occur in the United States east of the one-hundredth meridian, excepting Texas, are considered. Keys are given for setting off the families, genera, and species, and descriptions of the male and female are included for the various species. Thirty-one plates, mostly original illustrations of the parts of the anatomy used in specific determinations, are included. One other important feature is the host index and the synonymic index. A selected bibliography is also given.

While it is unfortunate that the fleas of the western part of the country were not available to the author for discussion, this is a valuable and much needed addition to the taxonomic literature of the fleas, and had the author taken up the medical implications of fleas it would have greatly enhanced the value of the publication to the medical profession.

LEONARD C. HASEMAN

A Survey of Hospital Services and Finances in the Philadelphia Area—*Philadelphia: The Community Fund of Philadelphia and Vicinity,* 1939. 96 pp.

The outstanding 1939 Survey of hospital services and finances in any large city was that made by the Hospital Council of Philadelphia under the guidance of C. Rufus Rorem, Ph.D., C.P.A., as consultant.

The report is brief—59 pages of text and 42 tables—and yet it says much that should guide the people of Philadelphia in shaping the development of their hospital service. Emphasis was placed on external rather than internal problems of the hospitals, and light was thrown upon the public's expenditures for hospital care rather than the hospital's expenditures for operation or fixed charges.

Some of the conclusions in brief are as follows:

The main problem is *not* to erect more hospitals, but to support those now in existence

Facilities for long term illness are overcrowded and those for the acutely ill would be better utilized if coördinated into a general Philadelphia Plan

The total annual hospital bill for the community is not unduly high

The total operating expenses in government hospitals are undoubtedly lower than should be considering the importance of good service

Government support of non-government

hospitals is a rational method of utilizing existing capital investment

A plan of hospital care insurance providing the minimum type of board and room service to persons of small means should be considered.

The Survey will have been well worth the expenditure and work it entailed if, out of it, two results are achieved: (a) unnecessary hospital building avoided, such capital as is available being used where the greatest need exists; (b) if a plan of insurance is developed by which the lower income group can pay its own way in the wards of the hospitals.

HOMER WICKENDEN

Radio Manual—A Compilation of Radio Broadcasts for Mouth Health Education—*New York: Oral Hygiene Committee of Greater New York*, 1939. 202 pp. Price, $1.50.

Previous to writing his thoughts on this *Radio Manual*, your reviewer listened to Paganini's "Moto Perpetuo," as played by Toscanini's radio symphony orchestra. The music proved most enchanting.

Is it surprising, then, that as these compilations of dental health broadcasts were read, questions arose as to their listener appeal? How many persons will turn the dial to health talks when more enjoyable programs of music, comedy, forum discussions and radio playhouses are offered? Certainly if the radio is to be effectively used to promote desirable health practices, technics are necessary to attract the attention of listeners to radio health talks.

Welcome, then, is this volume representing as it does the thought and presentations of prominent dentists and health workers of New York. It is a significant addition to the field of public health education. Particularly is this true because it illustrates not only what ought to be done, but also what not to do when broadcasting health information. Thus it may be a means of improving health education programs through the ether.

To give a few examples—one prominent dentist started his broadcast "before I start to tell you some of the recent discoveries, I should like to tell you the reason for this growing concern"—obviously too pedantic.

In another talk, a speaker begins his message with a paragraph altogether too scholarly, "Members of the dental profession like their medical colleagues who practice in accordance with modern scientific principles."

On the other hand, a radio talk with an appealing introduction is exemplified by the following, "Sarah Lyman is a pupil in a high school. Sarah's father is a painter who averages two days of work a week."

Included in this volume are three dialogues. One called "Mickey McGonigle's Missing Molars" explains preventive dentistry for the sixth-year molar in an amusing manner that will keep listeners from turning off the program.

In all, there are in this manual 44 broadcasts on 13 subjects, among them, Children's Dentistry, Dental Infection, Diet, Medico-Dental Relation, Mouth Hygiene, Orthodontia, Periodontia, Preventive Dentistry, Prosthetics, Public Health and X-rays.

J. M. WISAN

A Textbook of Practical Nursing—*By Kathryn O. Brownell. Philadelphia: Saunders*, 1939. 418 pp. Price, $3.00.

The author states that "the purpose of this book is to provide information needed by the practical nurse in her chosen profession." The principles, technics, and methods of practical nursing have been brought together in one volume.

The first two chapters of the book are on anatomy and physiology, the remainder on actual technics and practical

procedures. There are suggestions on cooking and foods for the sick.

The author describes the use of toxin-antitoxin for the young child. This seems a bit out of date. Later information regarding the use of toxoid might have been substituted.

The use of 95 per cent alcohol for disinfecting thermometers is recommended. In this same chapter a heading is on " How to Take Pulses," no doubt an error.

A unique element in arrangement is found at the end of each chapter, a brief true and false type of examination; also a bibliography is included. The student should find the professional word list given at the end of the book a stimulating source for building a vocabulary.

The book is written simply, and should be of interest and help to those who desire the essential information relating to the care of the sick.

MARY ETHEL PICKETT

Dental Health Organizations in State Departments of Health of the United States—*Public Health Bulletin No. 251. Washington: U. S. Government Printing Office,* 1939. 86 pp. Price, $.15.

This interesting publication gives the most complete survey of dental organizations in the states of this country that has so far been compiled. Five years ago data relating to dental activities in the state departments or boards of health were compiled. Such revolutionary changes occurred between 1933 and 1938 as to require a complete revision of the matter. The changes mentioned were due largely to federal funds under Titles V and VI of the Social Security Act.

A short history tells us that though the first state health organization was established in Massachusetts in 1869, it was not until 1918 that the first dental service was initiated, in North Carolina. Virginia was the first state to appoint a dentist on the State Board of Health, in 1916. In 1933 dental units were operating in 13 states. Five other states had such units prior to 1929 but discontinued them before 1933 on account of lack of funds. The great increase has come since 1935, when the Social Security Act became operative. By July, 1938, there were dental divisions or subdivisions in 35 state departments of health.

A list of these states is given, with details of the organization and the funds allotted under the Social Security Act. Altogether, the *Bulletin* is very enlightening and should have a place in every standard library. There is no attempt to evaluate or compare the dental programs of the different states, but the information furnished is useful not only on account of its factual value but as a guide and aid to other states about to inaugurate such services.

MAZŸCK P. RAVENEL

Educational Programs for Expectant Parents: Analysis of Replies to a Questionnaire Survey—*By Ellen D. Nicely, R.N., and Ella Geib Greene. Cleveland: Cleveland Child Health Association,* 1939. 77 pp. Price, $.50.

The analysis of two questionnaires on educational programs for expectant parents makes up this study. Persons concerned with the status of lay obstetric education in state or local programs will find information regarding the development, extent, and content of such programs. Replies were received from 48 states or territories, and brief narrative reports from each state replying are given. These indicate that considerable stimulus for lay obstetric education has developed as a result of providing Social Security funds in the past few years.

The question sent to cities included

requests for information regarding the methods for promoting and conducting classes. The investigators inquired into: the amount of coöperation or approval by medical societies; the reason classes were established; the qualifications of teaching personnel; the content and number of lectures; for whom they were available; how many attended; how this number compared with the total number of pregnant women; and finally, whether there have been reductions in the mortality rate as a result of instruction.

Considerable value is given to the analysis of the questionnaires on local programs by including narratives from cities where classes for mothers and fathers are held. Cleveland, Flint, New Haven, and New York are pioneering in instruction for expectant fathers. Evidence would seem to be accumulating to prove that a maternal health education program is not complete until expectant husbands as well as wives are informed about women's needs during pregnancy.

The replies show that classes for expectant mothers are conducted by many organizations. Visiting Nurses Associations, local health departments, and hospitals are the chief sponsoring agencies. As might be expected, the investigators found that the content of courses for mothers differs widely. Also the number of lectures, demonstrations, and films varies from 4 to 52. No involved statistical procedures were used in making this analysis. The returns were tabulated and explanatory comments on the interpretation of answers were added. It was not the intention of the investigators to draw conclusions but one is clear enough. Lay education can be of assistance in reducing maternal and infant mortality and morbidity.

Dr. Richard A. Bolt, the Director of the Cleveland Child Health Association, is to be commended for having these two members of his staff make this study which demonstrates the growth of and the need for more adequate lay obstetrical instruction. An appendix gives the bibliography, demonstration materials for mothers' classes, and questionnaire schedules.

DAVID B. TREAT

The Vitamins: A Symposium Arranged Under the Auspices of the Council on Pharmacy and Chemistry and the Council on Foods of the American Medical Association—*Chicago: American Medical Association,* 1939. 637 pp. Price, $1.50.

This splendid review of the vitamin situation brings up to date the information that is accumulating so rapidly in this field. After an introductory chapter by Dr. Morris Fishbein, the subject of vitamin A is thoroughly reviewed by 5 different authors. L. S. Palmer sets forth the chemistry of vitamin A and of substances having a vitamin A effect. Otto A. Bessey and S. B. Wolbach treat of its physiology and pathology. S. W. Clausen writes on its pharmacology and therapeutics. Hazel E. Munsell and Lela E. Booher describe the methods of assay; give the food sources of the vitamin; its requirements in human nutrition and practical recommendations for its intake.

The discussion of vitamin B occupies 7 chapters. E. M. Nelson describes the various components of the B complex, and R. R. Williams discusses the chemistry of thiamin. The physiology of vitamin B by George R. Cowgill, the pathology of beriberi by Edward B. Vedder, and the therapeutic use of vitamin B by Maurice B. Strauss follow in the order given. Methods for the assay of the vitamin and its food sources are given by Hazel E. Munsell. The human requirements for vitamin B_1 by Cowgill occupies the last chapter of this group.

Three chapters are taken up by a discussion of the chemistry, physiology,

pathology, dietary sources and requirements of riboflavin by Lela E. Booher, A. G. Hogan, H. C. Sherman, and Caroline S. Lanford respectively.

One chapter only is devoted to vitamins in relation to the prevention and treatment of pellagra. W. H. Sebrell is the author.

The subject of vitamin C is covered in 6 chapters. C. G. King writes on its chemistry and physiology; Gilbert Dalldorf on its pathology; Otto A. Bessey of the methods of assay and dietary sources; Sybil L. Smith of the human requirements; and Arthur F. Abt and Chester J. Farmer on its pharmacology and therapeutics.

In 5 chapters, vitamin D is treated in a similar manner by Charles E. Bills, Alfred T. Shohl, E. M. Nelson, Phillip C. Jeans and Genevieve Stearns, and Edwards A. Park. The physical and chemical aspects of ultra-violet irradiation are described by W. W. Coblentz and by Ethel M. Luce-Claussen.

These interesting and instructive chapters on the vitamins are brought to a conclusion by a discussion by H. A. Mattill on vitamin E, and by a brief review of other less well known vitamins by C. M. McCay.

The book contains 31 chapters. It is well documented and supplied with illustrations, tables, formulae, etc. The Council of Pharmacy and Chemistry and the Council on Foods of the American Medical Association are to be congratulated upon assembling for this symposium such an outstanding group of authorities. No individual or library interested in keeping abreast of the advances being made in vitamin research can afford to be without a copy of this book. IRA A. MANVILLE

Manual of Public Health Nursing —*Prepared by The National Organization for Public Health Nursing. New York: Macmillan*, 1939. Price, $2.50.

The 1939 edition of the *Manual of Public Health Nursing* is entirely rewritten and greatly enlarged to meet the current needs in public health nursing. It is divided into 3 parts: I Administration, II Family Health, III Services to the Family.

The aim of the manual is "to suggest procedures which may serve as a guide to the public health nurse in the field and which may be applied to county, small community, state or large city services." The fundamental principles of public health nursing underlie the technics and procedures suggested for use in homes, schools, clinics, and industrial plants.

The education and preparation of the public health nurse are given greater consideration than in the 1932 edition. The Minimum Qualifications for Those Appointed to Positions in Public Health Nursing for 1935–1940 as prepared by the Education Committee of the National Organization for Public Health Nursing is included in the appendix. Throughout, qualifications are suggested for the nurse who is doing a specialized type of service such as: industrial nursing, orthopedic nursing, or in the service for control of syphilis and gonorrhea. The growth and development of both the nurse and the program can be facilitated by staff education and supervision. The procedures suggested to accomplish this are excellent. The nurse working alone, particularly, needs a good basic preparation because she cannot benefit by staff education and daily supervision.

None of the detailed technics and procedures of the earlier edition have been omitted, and newer things have been added, such as the acceptable practices in pneumonia treatment. While the communicable diseases and immunization are incorporated in the chapter on morbidity they will probably prove nonetheless usable because of this arrangement. The material concerning the public health nurse in ortho-

pedic, tuberculosis, syphilis and gonorrhea programs is greatly enlarged and improved. Those who participated in the rewriting of the manual have succeeded in providing a guide to the newer aspects of public health nursing

The book is highly recommended for use by nurses working alone and for the staff of both public and private agencies. No matter what type of service a nurse may be engaged in, assistance in solving her many problems will be found in "The New Manual."

RUTH M. SCOTT

Municipal Administration—*By John M. Pfiffner. New York: Ronald Press*, 1940. 582 pp. Price, $4.00.

To deal adequately with all of the problems of municipal administration in a single volume requires an omniscience which few people possess. The author has recognized the need of a book giving a general picture of problems confronting various municipal departments and the responsibility which rests upon citizens for the improvement of municipal government through intelligent support and criticism of administering officials. The book, definitely written as a college text, is not intended to be a handbook in any particular field. The introduction covers the municipality as a management problem.

Part I, Organization, includes chapters on the principles of organization and the governing body. Part II, Staff and Housekeeping Functions, includes chapters on administrative research and management planning, finances, and personnel. Part III, Protective Functions, covers police, the courts, traffic, fire and structural safety, and public health. Part IV, Public Welfare, deals with social service and institutional management. Part V, Physical Planning, includes land use, housing, and airports. Part VI, Public Works, deals with engineering, sanitation and water supply. Part VII, Public Utilities and Part VIII, Cultural Activities, complete the contents.

The health officer or student of public health reading the book will find little in the chapter on public health, of 30 pages, which will help him in his technical job, but much food for thought in the chapters on relationships between departments and the principles of administration as related to all departments.

It seems unfortunate that the author has not somewhat further digested the immense amount of material which he has consulted in the preparation of the book, and given the reader the value of his judgment of the administrative practices of various departments, their similarities and differences, strengths and weaknesses.

In organizing the material the author has chosen to place public health under the general heading of "protective functions" together with police and fire and structural safety, while in the discussion in the chapter on public health he indicates that it is rapidly being concerned more with welfare and health promotion than with protection, and then places public welfare in a separate category.

In the chapter on fire and structural safety, one reads of the value of the rating scale of the National Board of Fire Underwriters in the elevation of technical standards in fire administration, though in the chapter on public health the author apparently fails to recognize the similarity between this rating scale and the *Appraisal Form.*

One interested in public health is surprised to note the meager reference to the health services for school children, though in many communities this forms a very important item in the school program. The author leaves the embarrassing question of administrative responsibility for this service strictly alone.

Though there is meager treatment of many items upon which one would like

to have the considered judgment of a student of municipal administration, health workers will find in this book a broad view of the problems of their coworkers in other fields which is sure to be at once stimulating and sobering.

W. F. WALKER

A Textbook of Bacteriology—*By Hans Zinsser, M.D., and Stanhope Bayne-Jones, M.D. (8th ed.). New York: Appleton-Century,* 1939. 990 pp. Price, $8.00.

This edition is "for students and practitioners of medicine and public health," and presents material of value to those for whom it is intended. The table of contents is altered in form, but has much the same list of chapters as the seventh edition. The omission of the chapter on protozoölogy is laudable. The book still constitutes a useful treatise for medical beginners.

The volume contains 990 pages divided into eight sections exclusive of table of contents and index. The sections deal, respectively, with general bacteriological biology and methods, infection and immunity, pathogenic microorganisms (the major section), the rickettsial diseases, the spirochetes, medical mycology, virus diseases, and technical methods. The list of references following each chapter adds greatly to the value of the work, and the index is sufficiently complete to be of real usefulness. The book is well bound, printed, and edited.

Much of the text is interesting and stimulating. One reads the chapter on "An introduction to the study of infectious diseases" with interest and profit, and with the introductory chapter on history and scope, it should inspire the student with a desire to learn more, should sharpen his appreciation of critical experimental study, and will show him the value of intelligent observation. However, in reading certain other sections, one might raise the question as to whether too much reliance has been placed on the technical background of the student, and his willingness to digest other highly technical and voluminous treatises in order to supplement brief paragraphs. Instances of this are especially numerous in Section I dealing with the general biology of bacteria, where discussions of oxidation-reduction systems, enzymes and enzyme action, the function of hydrogen ions, bacterial metabolism and nutrition, the functions and composition of the cell membrane, and other matters, are rather limited. The text could be improved by better arrangement, and a more generous use of tabular and illustrative matter. Much is lost by relegating the formulae of culture media, serological methodology, staining, etc., to a condensed section at the back of the book. Many of the media, methods, stains, etc., serve admirably as illustrations and examples of the practical applications of theory and principle, and are of only minor value *per se*.

Turning to the medical bacteriology proper, the treatment is in the main adequate but variable. The chapters on the common cold, pneumonia, influenza, and the hemophilic group are excellent, but the etiology and epidemiology of whooping cough are not as fully treated as might be wished. The discussions of viruses and virus diseases are stimulating but all too concise. The chapter on streptococci and scarlet fever is less satisfactory. The picture is lacking in scope, and the significance of the Lancefield classification is not sufficiently clarified in its relation to human infection and public health. However, what is given is accurate. The chapters on the genus *Neisseria* are commendable, but make no mention of *Neisseria flavescens*. The chapter on diphtheria is good, but one would like to see a more complete discussion of the significance of the gravis and mitis types in this country, and have more evidence indi-

cating that virulence of the organism does not usually disappear during convalescence. The consideration of the present status of diphtheria prophylaxis with alum precipitated toxoid, seems too brief, and the important principle of primary, secondary, and prolonged stimuli in active immunity in general is not discussed, although the latter was mentioned in the seventh edition. Throughout one receives strongly the impression that new material has been superimposed on the old in a rather unsystematic manner, so that there are numerous repetitions and interruptions in continuity.

However, these criticisms deal chiefly with selection and arrangement of material. By and large, this book achieves its object, and does it creditably.

The book is well bound and put together. MARTIN FROBISHER, JR.

Reports on Medical Progress, 1939—*As published in the New England Journal of Medicine. Compiled and Edited by Robert N. Nye, M.D. Boston: Little, Brown,* 1940. 562 pp.

The marvelous advances in all sciences which have been made for some years past is an old study. It is almost as old, though not so well known to the public, to say that among the many sciences in which almost miraculous discoveries have been made, none have outstripped medicine.

It would be a bold man who attempted to write a review of this book. This is an age of specialism, and a man who can keep up even with his own specialty is doing well, so rapid have been the advances and discoveries. This book covers the whole range of medicine and many allied subjects in 52 chapters by as many authors, all of whom are recognized as specially prepared in the subjects of which they write. It is evident that anything like a critical review would have to be prepared by almost as many reviewers, so we fall back on the Foreword, which tells us better what the book is than most reviewers could.

The *New England Journal of Medicine* has for a number of years published progress reports of the various branches of medicine, but experience led them in the fall of 1938 to plan a new approach for 1939. The articles contained in the book before us are the result. The authors were carefully selected and instructed to write "not meticulous reviews of the literature, but simple and straightforward statements of those particular aspects of each subject that had been proved to be of value in diagnosis and treatment." The references make no pretense of being complete but are sufficient to guide those who desire more extensive and detailed information. The book is designed to be of use to the general practitioner as well as to the specialist who wishes to keep in contact with recent advances in the field of medicine other than his own specialty.

The reputation of the *New England Journal of Medicine* which sponsored these reports is of itself sufficient guarantee that they are authentic, and when we scrutinize the list of contributors we cannot but feel that the selections have been wise, and the authors have accomplished their tasks in a most satisfactory manner.

The volume is well printed and bound. The index is adequate. For reference along the lines laid out, it is, as the *Journal* and Editor hoped, "A unique type of yearbook."

MAZŸCK P. RAVENEL

A SELECTED PUBLIC HEALTH BIBLIOGRAPHY WITH ANNOTATIONS

RAYMOND S. PATTERSON, PH.D.

Cancer and Glandular Therapy—Health workers will have at least a casual interest in this warning against the needless and excessive use of estrogenic substances. When women of uncertain years tell each other of the benefits to be expected from "shots" it is high time for nurses and other health authorities to spread a word of caution.

AUCHINCLOSS, H., and HAAGENSEN, C. D. Cancer of the Breast Possibly Induced by Estrogenic Substance. J.A.M.A. 114, 16:1517 (Apr. 20), 1940.

O.T., P.T., and Arthritis—These dissertations on occupational and physical therapy in the treatment of arthritis should be of interest to all wide-awake health workers, for those of us who are not now concerned in some way with the problem of chronic disease, are likely to find ourselves facing the issue some day.

BELL, C., and SWAIM, L. T., Occupational Therapy in Arthritis, and SWAIM, L. T., Physical Therapy in Arthritis. Pub. Health Nurs. 32, 4:243 (Apr.), 1940.

Housing and Illness—There are many arresting findings in this study but this one stands out with especial meaning for sanitarians: the per cent of illness of one week or more duration rises markedly with the degree of crowding. This is especially true of pneumonia and tuberculosis.

BRITTEN, R. H., *et al.* Certain Characteristics of Urban Housing and Their Relation to Illness and Accidents: Summary of Findings of the National Health Survey. Milbank Quart. 18, 2:91 (Apr.), 1940.

Reassuring News for Welders—There are health hazards associated with any type of welding, but when the hazards are recognized and proper safeguards are erected, they should not constitute a serious menace to health.

BRITTON, J. A., and WALSH, E. L. Health Hazards of Electric and Gas Welding. J. Indust. Hyg. & Toxicol. 22, 4:125 (Apr.), 1940.

How to Hold Venereal Patients—You will search far to find so convincing a recital of practical venereal disease case finding and holding methods, every one tested in the fire of year-after-year usage. One social worker is quoted to the effect that it is as important to know what kind of person it is who has syphilis as it is to know what kind of syphilis he has.

CADWALLADER, A. Syphilis Case-Finding and Case-Holding. Pub. Health News (New Jersey State Dept. of Health), 24, 2:54 (Apr.), 1940.

Is Rheumatic Fever a Contagious Disease?—There probably are both hereditary and environmental factors involved in rheumatic fever. Either these factors must act over a long period of time or the disease has a long incubation period. The same factors that seem to favor rheumatic fever, increase tuberculosis. This paper is another valuable document in our efforts to plumb the darkness which surrounds this miserable disease.

GAULD, R. L., and READ, F. E. M. Studies of Rheumatic Disease. Milbank Quart. 18, 2:161 (Apr.), 1940.

They Fly Through the Air—Have you ever really studied a sneeze? By means of high speed photography

you may get a convincing picture of what happens. Incidentally one can also gauge the speed at which the droplets travel. In one of the milder and more lady-like sneezes 4,600 droplets may be counted.

JENNISON, M. W., and EDGERTON, H. E. Droplet Infection of Air: High-Speed Photography of Droplet Production by Sneezing. Proc. Soc. Exper. Biol. & Med. 43, 3:455 (Mar.), 1940.

School Child Health Examinations—In all but 8 states medical examinations of school children are either required, or " recommended " by state educational departments. In all but 7 there are regulations governing the examination of high school athletes. This seems to be a significant statistic.

JONES, L. M., and HATFIELD, J. E. The Sanction of the Health Examination. Research Quart. 11, 1:19 (Mar.), 1940.

Of Interest to Home Economists—It is the poor that have the children. We all know that, but here is an analysis of residents in three types of communities in which the families were grouped according to numbers of children. From the study we learn some of the economic penalties of parenthood.

LORIMER, F., and ROBACK, H. Economics of the Family Relative to the Number of Children. Milbank Quart. 18, 2:114 (Apr.), 1940.

Slum Clearance Is Health Improvement—Evidence is incontestable that slum environment precludes the control of preventable diseases in blighted areas. Public housing becomes a public health measure.

MARQUETTE, B. Housing and Health Relations Examined. Pub. Health Rep. 55, 13:547 (Mar. 29), 1940.

Production of More Good Than Evil—Rapid increase in persons over 50 and decrease in those under 20 will markedly change characteristics of the industrial worker population, and health problems in industry. What these changes may be is of concern to all health workers; hence this peek into the future becomes an important paper.

MCCORD, C. P. Industrial Workers in 1960. Indust. Med. 9, 4:173 (Apr.), 1940.

Shoes That Fit vs. Health Shoes—Here is a useful discussion of the characteristics of a good shoe for feet that are not painful, as well as the examination and treatment for painful feet. In the face of so much misinformation broadcast by some shoe manufacturers and by quacks, this rational paper becomes required reading.

OBER, F. R. Shoes and Feet. J.A.M.A. 114, 16:1553 (Apr. 20), 1940.

Where Rheumatic Fever Flourishes—There are no public health procedures effective against rheumatic fever, so it is well to review existing knowledge: it is a cold climate disease; it runs in families—this is an opening wedge—but is not essentially hereditary; it is a city disease; streptococci have something to do with the cause.

PAUL, J. R. Rheumatic Fever. Milbank Quart. 18, 2:156 (Apr.), 1940.

Age-Changes in Tuberculosis—Analyzing tuberculosis deaths in England through the succeeding generations it is found that, in both male and female, the rates are affected by the special increase in incidence among young adults that occurred in the war years 1914–1918. Findings resemble those from Frost's Massachusetts Studies.

PICKEN, R. M. F. The Age Selection of Mortality from Tuberculosis in Successive Decades. Public Health. 53, 7:145 (Apr.), 1940.

Measles Virus Propagated on Chick Embryo—Measles virus makes no recognizable lesion on developing chick embryo, yet after 20 serial passages, extending over 100 days, it will produce the disease in monkeys.

This study led to some other interesting findings about the properties of measles virus.

RAKE, G., and SHAFFER, M. F. Studies on Measles. J. Immunol. 38, 3:177 (Mar.), 1940.

Finding Employed Syphilis Cases—Syphilis in the United States is one hundred times the incidence in Sweden. Like tuberculosis, syphilis presents an economic problem. If the syphilis prevention program could include the workers in the mining and manufacturing trades it would reach half the people in the country. Its elimination would mean more efficient industrial production.

RUSSELL, A. E. Syphilis Case Finding in Industry. J.A.M.A. 114, 14:1321 (Apr. 6), 1940.

Thoughts Anent the Full Dinner Pail—In underfed mice fewer tumors are formed and they appear at a later time than in full-fed animals. Once under way the tumor does as well in one as in the other.

TANNENBAUM, A. The Initiation and Growth of Tumors. Am. J. Cancer. 38, 3:335 (Mar.), 1940.

BOOKS RECEIVED

MEN AGAINST MADNESS. By Lowell S. Selling. New York: Greenberg, 1940. 342 pp. Price, $3.50.

SOCIAL AND BIOLOGICAL ASPECTS OF MENTAL DISEASE. By Benjamin Malzberg. Utica: State Hospital Press, 1940. 360 pp. Price, $2.50.

SILICOSIS. Proceedings of the International Conference held in Geneva from August 29 to September, 1938. Washington: International Labor Office, 1940. 223 pp. Price, $1.25.

CHEMOTHERAPY AND SERUM THERAPY OF PNEUMONIA. By Frederick T. Lord, Elliott S. Robinson and Roderick Heffron. New York: Commonwealth Fund, 1940. 174 pp. Price, $1.00.

HANDBOOK OF THE HOSPITAL CORPS UNITED STATES NAVY, 1939. Washington: Bureau of Medicine and Surgery, Navy Department, 1939. 1015 pp. Price, $1.75.

MANUAL OF WATER QUALITY AND TREATMENT. Prepared and published by The American Water Works Association, 1940. 294 pp. Price, $3.00.

POISONS. THEIR ISOLATION AND IDENTIFICATION. By Frank Bamford. Philadelphia: Blakiston, 1940. 344 pp. Price, $4.00.

GETTING MORE OUT OF LIFE. Joseph Jastrow. New York: Emerson Books, rev. ed., 1940. 312 pp. Price, $2.00.

THE UNSEEN PLAGUE—CHRONIC DISEASE. By Ernest P. Boas. New York: J. J. Augustin Inc., 1940. 121 pp. Price, $2.00.

EXPERIMENTAL POLIOMYELITIS. By Morris Schaeffer and Ralph S. Muckenfuss. New York: Department of Health, 1940. 158 pp. Limited number available for institutions and laboratory investigators free.

PUBLIC WORKS ENGINEERS' YEARBOOK 1940. Chicago: American Public Works Association, 1940. 338 pp. Price, $3.50.

FIRST AIDS IN READING DIFFICULTIES. By S. Weir Newmayer. Philadelphia: North American Printing Co., 1940. 162 pp. Price, $2.00.

HEALTH SECTION REPORT—EIGHTH BIENNIAL CONFERENCE, AUGUST, 1939. New York: World Federation of Education Associations, 1940. 88 pp. Price, $.60.

THE FUNDAMENTALS OF PERSONAL HYGIENE. By Walter W. Krueger. 3d ed. rev. Philadelphia: Saunders, 1940. 304 pp. Price, $1.75.

PSYCHIATRIC CLINICS FOR CHILDREN. With Special Reference to State Programs. By Helen Leland Witmer. New York: Commonwealth Fund, 1940. 437 pp. Price, $2.50.

THE PUBLIC WELFARE ADMINISTRATOR. By Elwood Street. New York: McGraw-Hill, 1940. 422 pp. Price, $4.00.

HEALTH IS WEALTH. By Paul de Kruif. New York: Harcourt, Brace, 1940. 246 pp. Price, $2.00.

EDITH BARBER'S COOK BOOK. By Edith M. Barber. New York: Putnam, 1940. 524 pp. Price, $2.50.

CARE OF POLIOMYELITIS. By Jessie L. Stevenson. New York: Macmillan, 1940. 230 pp. Price, $2.50.

ASSOCIATION NEWS

SIXTY-NINTH ANNUAL MEETING
DETROIT, MICH., OCTOBER 8–11, 1940
HEADQUARTERS
Book-Cadillac Hotel and Hotel Statler

OFFICERS AND EXECUTIVE COMMITTEE DETROIT ANNUAL MEETING

DR. HENRY F. VAUGHAN, Executive Secretary of the Local Committee for the Sixty-ninth Annual Meeting of the Association in Detroit, Mich., October 8–11, announces the following Committee appointments:

Honorary Chairmen

Honorable Luren D. Dickinson
Governor of Michigan

Honorable Edward J. Jeffries, Jr.
Mayor of Detroit

H. Allen Moyer, M.D.
State Health Commissioner

Executive Committee

Abner Larned—*Chairman*
Michigan Committee for Infantile Paralysis

Henry F. Vaughan, Dr.P.H.—*Executive Secretary*
Health Commissioner, Detroit

L. T. Clark, D.Sc.—*Treasurer*
Director, Biological Division, Parke, Davis & Company

Stuart Pritchard, M.D.
President, W. K. Kellogg Foundation

William J. Norton, Ph.D.
Executive Director, Children's Fund of Michigan

Chairmen

L. T. Clark, D.Sc.—Finance Committee
Director, Biological Division, Parke, Davis & Company

Gustavus D. Pope—Reception Committee
President, Detroit Chapter, American Red Cross

Mrs. Henry F. Vaughan—Women's Reception Committee

Mrs. William J. Scripps—Women's Entertainment Committee

Clarence Selby, M.D.—Scientific Trips Committee
Medical Director, General Motors Corporation

Marjorie Delavan—Attendance Committee
Director of Health Education, Michigan Department of Health

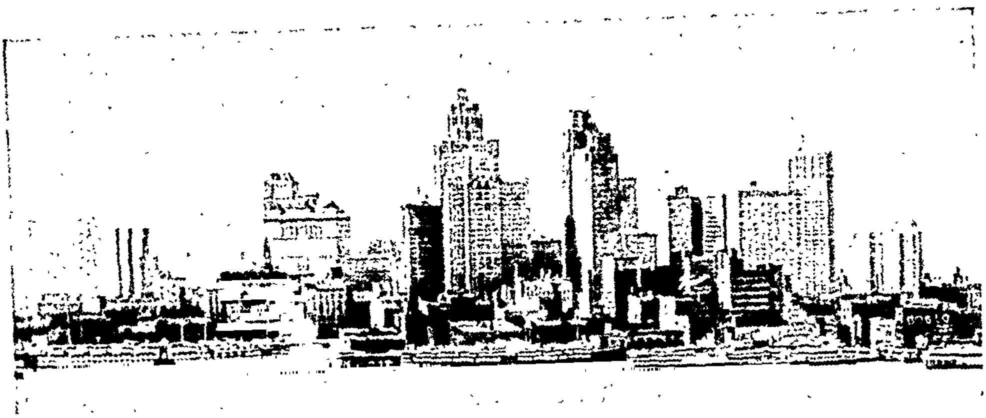
William J. Scripps—Radio Committee
Managing Director, Station WWJ, *The Detroit News*

Mary P. Connolly—Publicity Committee
Director of Health Education, Detroit Department of Health

G. M. Byington, M.D.—*Meeting Rooms Committee*
Director of Medical Relations, Detroit Department of Health

Carl G. Sedan—Registration Committee
Asst. Manager, Detroit Convention and Tourist Bureau

Arthur J. Madar—Transportation Committee
Detroit Department of Health



Skyline — Detroit

Detroit—Annual Meeting City

DETROIT, the "City of the Straits," welcomes the Fellows and members of the American Public Health Association for the annual meeting of that distinguished body.

Much water has gone over the mill since Cadillac landed his little body of pioneers on the banks of the Detroit River, and the change in the appearance of the city of that day was aided in no small measure by the sciences from which public health has grown.

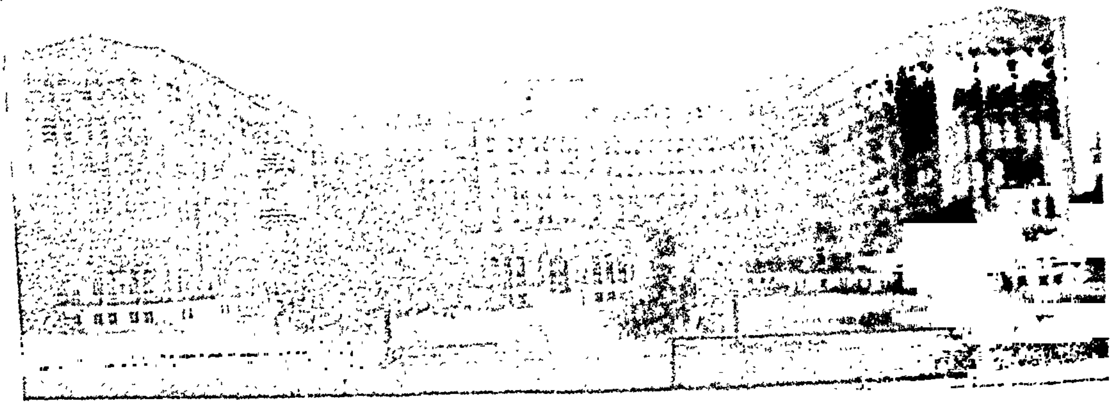
Berthelet's pump which furnished water for the habitants in 1824 has been gone these many years, and while the water which comes from the taps in Detroit houses comes from above the head of the Detroit River just as it did in 1824, its treatment has developed a huge organization necessary to deliver a safe supply of more than 20 billion gallons of water a year to nearly 2 million persons. Two modern filtration plants are in constant operation—one on the east side of the city at Water Works Park, and one on the west side known as the Springwell's plant. These plants consist of mixing chambers, coagulation basins, filters, and filtered water reservoirs to render the raw water a carefully filtered, chlorinated product to the resident consumers.

Visitors to Detroit will be able to inspect one of the largest sewage disposal plants in the world. The need for this plant was recognized for years but Public Works Administration aid finally made it a reality. Sanitary engineers and administrators will revel in the detail which has gone into the construction of the plant which makes Detroit a friendly neighbor in removing pollution from the Canadian shore as well as that carried to municipalities down stream.

Detroit has a well developed system of hospitals, the largest of which are municipally owned.

Receiving Hospital, which cares for emergencies and the indigent, is a teaching center for Wayne University College of Medicine and has well equipped and staffed divisions for surgery, medicine, and mental diseases.

Herman Kiefer Hospital, which is the communicable disease hospital of the Department of Health, consists of pavilions for the care of communicable disease, the largest of which is a tuberculosis unit of 800 beds. Here gathered under one roof is an outpatient department which is the diagnostic center of the city, a department for chest surgery, laboratories, and x-ray services. William H. Maybury Sanatorium, at Northville situated 24 miles from the city, has a bed capacity of



Herman Kiefer Hospital — Detroit

800 and serves as an extension of the service centered at Herman Kiefer Hospital.

The Detroit Tuberculosis Sanatorium, which for many years has served the city, recently added a new unit known as the Burt R. Shurly addition, adding to the number of beds available for the treatment of tuberculosis in the city.

Eloise Hospital, located just outside of the city at Eloise, covers many acres of ground. It is supported by Wayne County for the care of indigent acute and chronically ill and mental patients. The Henry Ford Hospital, Harper, Grace, St. Mary's, Providence, and Mt. Carmel Hospitals present research of interest to many engaged in health promotion.

It is expected that Detroit visitors will want to see an automobile plant and watch the wheels go round in the job of making motors. Such trips will be arranged and special trips will be available for those who are particularly interested in how the health of the workers in industry is protected. The industrial hygiene laboratories of the motor companies are planning to receive industrial hygiene workers during their stay in Detroit. Trips to the Ford Motor Company plant, some of the plants of the General Motors organization, and the Chrysler Corporation will be scheduled.

Members of the association who came to Detroit in 1924 will miss some of the tree-shaded streets which have given way to the demands of a motorized city. Woodward Avenue has become a 120 foot highway extending far up into Michigan, and in its middle reaches have sprung buildings which contribute to the cultural life of the city. The main library, which faces the Art Institute in the section of the city known as the art center, is the fountainhead to 24 branch libraries situated in sections to meet the needs of the residents. Housed in the Art Institute are world famous paintings, including also the famous Diego Rivera murals which caused so much controversy when they were unveiled.

Wayne University is within a stone's throw of the art center, and here the visitor will see the beginning struggle of a municipal university as it overflows into the surrounding neighborhood. A grant from the Horace H. Rackham Fund to the University of Michigan is making possible an educational center for the university in Detroit. The new center to be known as the Horace H. Rackham Educational Memorial will face Woodward Avenue next to the Art Institute. It is expected to be ready for occupancy in the fall of 1941.

North on Woodward Avenue to Grand Boulevard the engineering and beauty of the Fisher Building claims attention with its neighbor, the build-

Edison Institute — Greenfield Village

ing of the General Motors Corporation. If the visitor continues on out Woodward Avenue he will pass the Shrine of the Little Flower at Royal Oak, made famous by Sunday broadcasts, and at Bloomfield Hills, Cranbrook School and Christ Church, the latter a fine example of Gothic architecture built in a country-side setting.

Greenfield Village at Dearborn, in which Henry Ford has gathered a rare collection of "early Americana," will waft the visitor back to his grandfather's day as he is transported from building to building in a horse drawn carriage piloted by a coachman with a top hat and a handy whip. Dearborn Inn, not far away, offers fine food and a rest to tired feet after the tour of the village.

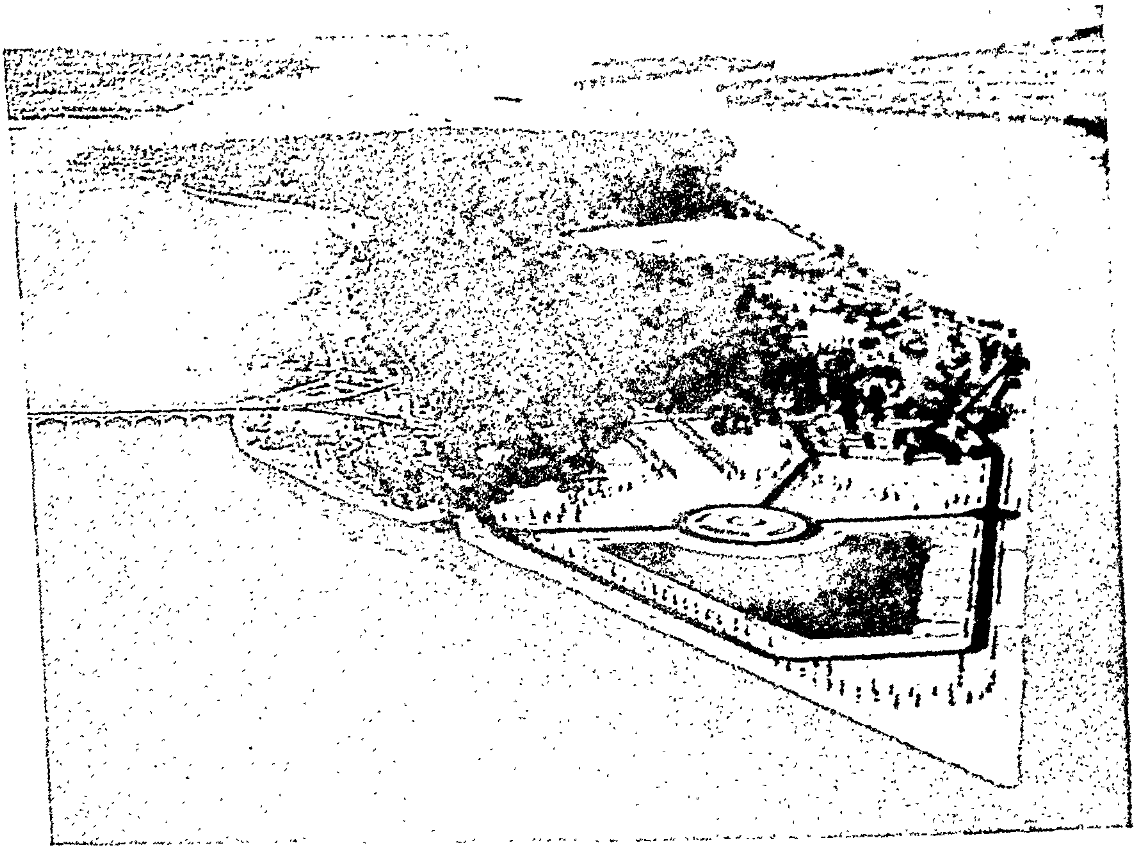
Belle Isle, a spot of green and beauty which looks as though it was dropped in the middle of the Detroit River, is a municipally owned playground. Boating, golf, riding, accommodations for picnics are all available. Two yacht clubs are situated on the shores of the island and guest privileges will be available. The Lake Short Drive, which is a continuation of Jefferson Avenue, enables the driver to follow the Detroit River to Lake St. Clair and many miles around the lake. The Grosse Pointe Yacht Club may be reached on this trip. Rouge Park covers 1,204 acres on the western border of the city.

The research laboratory of the Children's Fund of Michigan, located in Detroit, will have open house for those interested in nutrition research, and the Children's Center, another activity of the Fund concerned with child behavior, offers hospitality to the members of the Association.

Parke, Davis laboratories will be open to visitors and specially conducted trips will be arranged for those interested in pharmaceutical and biological products. The Difco laboratories likewise invite visitors.

Centers of learning in or near Detroit provide points of interest which many visitors will not want to miss.

Wayne University College of Medicine, the University of Detroit, Mary-



Belle Isle

grove College, and the Detroit public school system are all within easy reach. Ann Arbor, the home of the University of Michigan, is but an hour's ride from downtown Detroit, while Michigan State College at East Lansing requires but two hours travel on a four-lane highway with the laboratories of the Michigan Department of Health close at hand.

To those who can stay over and wish to learn of the administration of county health units, the Kellogg Foundation at Battle Creek offers a birdseye view of a unique piece of work. The distance to Battle Creek from Detroit is not great—less than three hours by automobile—and the administrative staff of the Foundation extends an invitation to those specially interested.

For those interested in school health the special schools maintained by the Detroit public schools provide some good examples: The School for the Deaf, the School for Epileptics, special schools for vision defects, as well as some new and completely equipped buildings devoted to health and physical education whose staffs extend cordial invitations to those who wish to visit them.

Department of Health clinics—venereal disease, tuberculosis, and child welfare—will be open for visitors, as well as the general laboratories and industrial hygiene laboratories maintained at Herman Kiefer Hospital.

Guest privileges will be available for golf devotees, and Detroit boasts of some fine courses which may be easily reached on an afternoon off from high scientific endeavor.

The State of Michigan and the City of Detroit say "come and visit us." The program committee offers a fine fare. The residents of the state and city promise to do all possible to make your stay pleasant.

Detroit Art Center

DETROIT HOTELS

Hotel	Room Capacity	Single Room: Without Bath	Single Room: With Bath	Double Room: Without Bath	Double Room: With Bath
Abington	336		$3.00 up		$4.00–$5.00
Barlum	800		2.00 "		3.00– 4.00
Belcrest	400		3.00 "		4.00– 5.00
Book-Cadillac	1,200		3.00 "		5.00– 6.00
Briggs	200		2.00 "		3.00– 4.00
Detroit Leland	800		2.50 "		4.00– 5.00
Fairbairn	400	$1.25	2.50 "	$2.50	3.00– 3.50
Fort Shelby	900		2.50 "		4.00– 5.00
Imperial	200		2.00 "		2.50– 3.50
Lee Plaza	475		3.00 "		5.00– 6.00
Norton	250	1.25	2.00 "	$2.50–$2.75	3.00– 4.00
Palmetto	324		2.50 "		4.00– 5.00
Prince Edward, Windsor	250		2.50 "		4.00– 5.00
Savarine	500	1.50	2.25 "	$2.50	3.25– 5.00
Statler	1,000		3.00 "		5.00– 5.50
Tuller	800		2.00 "		3.50– 4.50
Wardell	650		3.00 "		4.50– 5.50
Webster Hall	800	1.50	2.00 "	2.50	3.50– 4.00
Whittier	850		3.00 "		4.50– 5.00
Wolverine	500		1.50 "		2.50– 4.00

........(Cut off on this line and mail to the hotel of your choice).......

HOTEL RESERVATION BLANK FOR THE DETROIT MEETING
AMERICAN PUBLIC HEALTH ASSOCIATION, OCTOBER 8–11, 1940

To ....
(Name of Hotel)

Please reserve for me .... rooms for .... persons
for the A.P.H.A. Meeting.

Single room .... Double room ....

Maximum rate per day for room $.......... Minimum rate per day for room $..........

I expect to arrive .... If date of arrival is changed I will notify you at least 24 hours in advance.

Please acknowledge this reservation.

Name ....

Street address ....

City .... State ....

APPLICANTS FOR MEMBERSHIP

The following individuals have applied for membership in the Association. They have requested affiliation with the sections indicated.

Health Officers Section

Benedict B. Backley, M.D., Masonic Temple Bldg., Athens, Ohio, Athens County Health Commissioner

Joseph R. Bierman, M.D., City Hall, Allentown, Pa., Health Officer

A. J. Comeaux, M.D., Court House, Lafayette, La., Director, Lafayette Parish Health Unit

Joseph B. Copeland, M.D., 1011 Medical Arts Bldg., San Antonio, Tex., Acting Director, Bexar County Health Dept.

Patrick H. Fleming, M.D., 311 South Main St., St. Martinville, La., Director, St. Martin Parish Health Unit

Charles J. Hedlund, M.D., Baker, Ore., Baker County Health Officer

Frederick C. Johnson, Town Hall, South Braintree, Mass., Health Officer, Braintree Board of Health

Robert R. King, M.D., Box 192, Boone, N. C., Health Officer, Alleghany-Ashe-Watauga Health District

Peter Krupocki, M.D., Alturas, Calif., Associate Medical Officer, U. S. Indian Service

Frank U. Lee, M.S., Elgin Health Dept., Elgin, Ill., Health Officer

Gordon F. May, Town Hall, Stoneham, Mass., Health Officer

Joseph T. Mulcahy, LL.B., 22 Church St., Waltham, Mass., Director of Public Welfare

Harry F. Noyer, M.D., D.P.H., 256 County, New Bedford, Mass., Public Vaccinator, New Bedford Board of Health

W. Robert Orr, M.D., 104 Lincoln Way West, Mishawaka, Ind., Secretary, Board of Health

Robert E. Purdue, M.D., 625 West Ave., Norwalk, Conn., Health Officer

Charles E. Reddick, M.D., P. O. Box 634, 524 N. 4th, Paducah, Ky., Assistant Health Officer, McCracken County Health Dept.

Thomas F. Reitz, M.D., Hulman Bldg., Evansville, Ind., Secretary, City Board of Health

Edward L. Russell, M.D., Court House Annex, Santa Ana, Calif., Orange County Health Officer

Hollister M. Stolte, M.D., Box 538, McMinnville, Ore., Yamhill County Health Officer

James E. Stuart, M.D., 552 E. Second St., Plainfield, N. J., Consultant, Negro Health Program, New Jersey State Dept. of Health

Laboratory Section

C. F. Bain, B.S., Box 550, Coeur d'Alene, Ida., Sanitarian and Bacteriologist, Idaho Div. of Public Health

Gordon C. Brown, M.A., 4215 Stanwood Ave., Baltimore, Md., Student, Johns Hopkins Univ., School of Hygiene and Public Health

Mary B. Corso, A.B., 832 Bushwick Ave., Brooklyn, N. Y., Bacteriology Instructor, Adelphi College

Ben E. Diamond, M.A., 1346 Lyman Place, New York, N. Y., Bacteriologist

Wilder Dunn, B.A., 4929 Worth, Dallas, Tex., Director of Laboratories, Public Health Dept.

Archie M. Ecklund, M.D., Koloa Kauai, T. H., Health Officer and Bacteriologist, Territorial Board of Health

Delbert C. Foord, M.A., 4815 Santa Fe Ave., Los Angeles, Calif., Bacteriologist, Research Dept., American Can Co.

Bettylee Hampil, Sc.D., 1832 Spruce St., Philadelphia, Pa., Research Bacteriologist, Sharp and Dohme, Inc.

Herbert O. Hartung, B.S. in C.E., 6600 Delmar St., St. Louis, Mo., Chemist, St. Louis County Water Co.

Leslie A. Sandholzer, Ph.D., P. O. Box 1834, Norfolk, Va., Associate Bacteriologist, U. S. Public Health Service

Samuel H. Zia, M.D., Peiping Union Medical College, Peking, China, Associate Professor in Bacteriology

Vital Statistics Section

E. Douglass Burdick, Ph.D., Wharton School, Univ. of Pennsylvania, Philadelphia, Pa., Teacher, Statistics Dept.

Verna G. Kelley, R.N., 1503 Ten Eyck St., Jackson, Mich., Statistical Clerk, City Health Dept.

Frank R. Schroder, A.B., 2112 Ashby Ave., Berkeley, Calif., Supervisor on Federal Project in State Health Records

Engineering Section

Charles A. Butler, West Pine, Mt. Airy, N. C., Sanitarian, Surry County Health Dept.

Roy E. Dodson, Jr., B.S. in Eng., 806 Oregon Bldg., Portland, Ore., Assistant Sanitary Engineer, State Board of Health

Hayes Evans, Jr., Health Dept., Port Angeles, Wash., Sanitarian, County-City Health Dept.

Theodore R. Hazeltine, A.B. in C.E., City Bldg., Butler, Pa., Superintendent of Sewage Treatment, Butler and Grove City

Eugene M. Howell, M.S.P.H., 900 Sherman St., Denver, Colo., Assistant Sanitary Engineer, Farm Security Administration

Robert A. Wilson, B.S. in C.E., 518½ Fifteenth St., Moline, Ill., District Sanitary Engineer, State Dept. of Public Health

Bernard Young, Board of Health, Wailuku, Maui, T. H., Junior Sanitary Inspector, Territorial Board of Health

Industrial Hygiene Section

Robert M. Brown, B.S. in Ch.E., 925 Main St., Columbia, S. C., Chemical Engineer, State Board of Health

George A. Schlitt, A.B., Windsor, Colo., Sanitarian, State Health Dept.

Food and Nutrition Section

John L. Etchells, M.S., Box 5578, Raleigh, N. C., Assistant Bacteriologist, U. S. Dept. of Agriculture

Margaret S. Follstad, M.A., 115 S. Vine St., Harrisburg, Ill., Nutritionist, Div. of Child Hygiene, Dept. of Public Health

Herbert Jenkins, B.S., 22 Washington St., Somerville, Mass., Director of Laboratories, New England Dairies Inc.

C. Sidney Leete, B.S., Loudonville, N. Y., Associate Milk Sanitarian, State Dept. of Health

Arthur B. Quencer, B.S., 542 East 19th St., New York, N. Y., Chemist, Dairymen's League Co-operative Assn., Inc.

Robert G. Switzer, Ph.D., 512 N. Homer St., Lansing, Mich., Consultant for food companies

Maternal and Child Health Section

Emory H. Anderson, M.D., Paia, Maui, T. H., Government Physician of Mauka

Reginald W. Cline, D.D.S., 99 Pratt St., Hartford, Conn., Dentist, Hartford Board of Health

A. Godfrey Featherston, M.D., 219 West 133rd St., New York, N. Y., School Physician, Dept. of Health

Lawrence R. Jacobus, M.D., 2940 Summit, Oakland, Calif., Physician

George Kahn, M.D., 1778 Commonwealth Ave., Boston, Mass., Medical Inspector, Boston Health Dept.

Stephen V. Luddy, D.D.S., 5721 Mascher St., Philadelphia, Pa., Student, Univ. of Pennsylvania, School of Preventive Medicine and Public Health

Thistle M. McKee, M.D., 14 East Biddle St., Baltimore, Md., Student, School of Hygiene and Public Health, Johns Hopkins Univ.

Tipton Mullins, M.D., 88 Morningside Drive, Butler Hall, New York, N. Y., Physician-in-Charge, Dept. of Health

Viktor O. Wilson, M.D., State Dept. of Health, University Campus, Minneapolis, Minn., Director, Div. of Child Hygiene

Michael J. Zazzaro, D.M.D., 99 Pratt St., Hartford, Conn., Dentist, Hartford Board of Health

Public Health Education Section

Josephine J. Albrecht, A.B., 80 Federal St., Room 1234, Boston, Mass., Assistant to Executive Secretary, Boston Health League, Inc.

C. K. Chu, M.D., Dr.P.H., Public Health Personnel Training Institute, Kweiyang, Kweichow, China, Director

John W. Devereux, M.D., 405 Dillingham Bldg., Honolulu, T. H., Assistant, Venereal Disease Clinic, Palama Settlement

Roy P. Forbes, M.D., 1850 Gilpin, Denver, Colo., Vice-President, Denver Tuberculosis Society

Lester M. Fraley, Ph.D., State Teachers College, Johnson City, Tenn., Professor of Health Education

Edward R. Schlesinger, M.D., 165 Seaman Ave., New York, N. Y., Health Officer-in-training, Dept. of Health

Public Health Nursing Section

Sybil P. Bellos, R.N., 152 Grant Ave., White Plains, N. Y., Assistant Director of Nursing, Westchester County Dept. of Health

Helen C. Bosworth, 314 Franklin St., Denver, Colo., President, Lay Auxiliary, Public Health Section, Colorado State Nurses Assn.

Hazel V. Dudley, B.S., R.N., State Dept. of Health, Hartford, Conn., Director, Bureau of Public Health Nursing

Marion Ferguson, R.N., M.A., 2511 Que St., N. W., Washington, D. C., Nurse Supervisor, District of Columbia Health Dept.

Theodora A. Floyd, R.N., M.A., University of Hawaii, Honolulu, T. H., Director, Course in Public Health Nursing

Lillian A. Gardiner, M.S., 2111 Barclay St., Baltimore, Md.

Mary L. Gerstel, R.N., 659 Wrightwood Ave., Chicago, Ill., Student, Loyola Univ.

Margaret A. Hovsey, R.N., State Board of Health, Jacksonville, Fla., Dist. Supervisor of Nurses, State Board of Health

Teckla Jacobson, B.S., Cedar City, Utah, Dist. Nursing Supervisor, State Board of Health

Helen F. Johnson, 2553 West Grand Blvd., Detroit, Mich., Public Health Nurse, Dept. of Health

Helen Johnson, R.N., M. of N., Wrangell, Alaska, Public Health Nurse, Territorial Dept. of Health

Mabel Mortvedt, R.N., B.A., State Dept. of Health, Des Moines, Iowa, Assistant Director, Div. of Public Health Nursing

Grace Murray, R.N., 414 S. State St., Dover, Dela., Assistant Director, State Board of Health Nurses

Ann L. Schmich, R.N., B.S., 1907 Monroe St., Madison, Wis., Director, Visiting Nurse Assn.

Ora F. Scovell, R.N., Court House, Corvallis, Ore., Benton County Public Health Nurse

Carrie M. Wilson, R.N., 263 Bird Ave., Buffalo, N. Y., Nurse, Syphilis Control, Buffalo Health Dept.

Epidemiology Section

Ward Darley, Jr., M.D., 520 Metropolitan Bldg., Denver, Colo., Instructor in Medicine, Univ. of Colorado School of Medicine

William L. Fleming, M.D., Div. of Public Health, Univ. of North Carolina Medical School, Chapel Hill, N. C., Research Professor of Syphilology

Unaffiliated

Palmer Congdon, M.D., Juneau, Alaska, Tuberculosis Clinician, Territorial Dept. of Health

Germaine A. Guntzer, M.D., William Wirt Winchester Hospital, West Haven, Conn., Student, Yale School of Public Health

Fred C. Kluth, M.D., 101 W. Monument St., Baltimore, Md., Student, Johns Hopkins Univ., School of Hygiene and Public Health

Samuel Lilienthal, M.D., 2343 South Clayton St., Denver, Colo., Assistant District Physician, CCC, Colorado-Wyoming District, Littleton, Colo.

Maurice C. O'Shea, M.D., 103 East 84th St., New York, N. Y., Medical Examiner, Home Life Insurance Co.

Elizabeth A. Parmelee, B.S., 1579 Franklin, Denver, Colo., Medical Social Worker, State Dept. of Health

W. E. Stanfill, 421 West Aspen, Flagstaff, Ariz., Sanitarian, Coconino County Health Service

A. S. Walkowski, M.D., Anchorage, Alaska, Assistant Commissioner of Health, Territorial Health Dept.

DECEASED MEMBERS

Platt W. Covington, M.D., Salt Lake City, Utah, Elected Member 1919, Elected Fellow 1930

Richard S. Craig, B.S., Baltimore, Md., Elected Member 1930

Eloise A. Hafford, Pasadena, Calif., Elected Member 1935

H. W. McComas, M.D., Oakland, Md., Elected Member 1920

Fred L. Shoenberger, Columbus, Ohio, Elected Member 1939

E. H. Smith, M.D., Redding, Conn., Elected Member 1919

ELECTION OF THE CUBAN PUBLIC HEALTH SOCIETY, HAVANA, TO AFFILIATED MEMBERSHIP

THE Governing Council of the American Public Health Association by unanimous vote has recently elected the Sociedad Cubana de Salubridad Publica of Havana, Cuba, to affiliation with the Association.

This Cuban Public Health Society was organized August 31, 1937, with its headquarters at the Instituto Finlay, Havana. The Society formally requested affiliation with the A.P.H.A. in October 1939, but the application reached the Association after the last meeting of the Governing Council, and a circular vote was therefore necessary.

The current roster of the Society shows 38 members, of whom 20 are members or Fellows of the A.P.H.A. in good standing.

The officers of the Association are: Dr. Antonio Diaz Albertini, President, and Dr. Carlos Pineiro, Executive Secretary. The application was sponsored by Dr. Domingo F. Ramos, a Vice-President of the American Public Health Association and Minister of War of Cuba.

CLOSING DATE FOR SUBMITTING FELLOWSHIP APPLICATIONS

MEMBERS who may be interested in applying for Fellowship in the A.P.H.A. are hereby advised that Fellowship applications should be received not later than August 1, to insure consideration at the 69th Annual Meeting.

EMPLOYMENT SERVICE

Replies to these advertisements, when keyed, should be addressed to the American Public Health Association, 50 West 50th Street, New York, N. Y., identifying clearly the key number on the envelope.

The Association Employment Service seeks to bring to the attention of appointing officers the names of qualified public health personnel and to act as a clearinghouse on employment. This is a service of the Association conducted without expense to employer or employee.

From the registry of persons available, selected announcements are published from time to time. Appointing officers may obtain lists of all registrants on request.

The Association welcomes inquiries with regard to persons qualified, especially in the following classifications:

- Administrative health officers
- Epidemiologists
- Public health educators
- Maternal and child health physicians
- Industrial hygienists
- Laboratory directors

Positions Wanted

ADMINISTRATIVE

Administrative public health or epidemiological position is desired by well qualified physician, with M.P.H. degree, 16 years' experience as county and city health officer, and 3 years epidemiologist. **A206**

Physician, with M.S.P.H., now completing course for Doctor of Public Health degree, who has had 6 years' experience as public health administrator, seeks administrative position in full-time city or city-county health department. Available July 1. **A367**

A position in epidemiology or administrative public health is desired by physician with C.P.H. from Johns Hopkins, 11 years' administrative public health experience and excellent background of communicable disease control and school health service. **A368**

Physician, M.D., Yale; M.S.P.H., Columbia; also short course for Health Officers, Vanderbilt; good clinical background; 3 years' public health experience; will consider appointment in child health, epidemiology, or public health administration. **A350**

Physician, M.P.H., Harvard; well experienced in city and rural health administration, will consider appointment as district health officer or in city or state health department. **A418**

Physician, 32; M.D., 1936; postgraduate course in venereal disease control, experienced as district health officer and in organizing and publicizing syphilis control campaign; now employed in charge venereal disease clinics in metropolitan health department; seeks venereal disease control post with opportunity to organize or administer program. **A437**

Experienced physician who has been local health officer and school physician in New York State, several months' experience as acting city health officer, with M.P.H. from Harvard School of Public Health, wishes position in administration, epidemiology, or public medical service. **A423**

Well qualified physician, with M.P.H. from Johns Hopkins, and experienced as county health officer and now assistant health officer in a large city, will consider county or city administrative position. **A383**

HEALTH EDUCATION

Young woman, Ph.D., Columbia University, splendid background of experience in health education, will consider position as director of public health education. **H294**

Young woman, M.A., Health Education, Teachers College, Columbia; with splendid international experience, seeks position as director of health education. **H369**

INDUSTRIAL HYGIENE

Industrial hygiene chemist, experienced in sampling, analysis of toxic industrial gases and fumes; petrographic dust analysis; dust counting; general toxicological analysis; chemical microscopy; also experienced in making industrial hygiene surveys, with knowledge of German, French, and Spanish, 4 years' experience, desires position. **I457**

LABORATORY

Experienced teacher in biochemistry and bacteriology; Ph.D., Iowa; now laboratory director in midwestern state; will consider teaching, executive, or administrative position. **L440**

Experienced bacteriologist, young man of 33, Sc.B., who for several years has been in charge of state laboratory doing public health and diagnostic bacteriology,

immunology, and serology, will consider opening. L427

Experienced woman bacteriologist, Ph.D., University of Illinois, 1937, wishes position in teaching or research. Excellent bibliography and references. L410

Physician, C.P.H., Harvard-Technology; experienced as bacteriologist and pathologist and director of state laboratories, desires position. L208

SANITARY ENGINEERING

Public health engineer, B.S. in Civil and Sanitary Engineering; C.P.H., University of North Carolina; 3 years' experience with state department of health as field supervisor during which time he was in charge of shellfish sanitation; also experienced as district sanitarian; seeks position in public health engineering field. E430

Public health engineer, B.S. in Sanitary Engineering from Massachusetts Institute of Technology; experienced in Massachusetts, Connecticut, and Kentucky, seeks position as sanitary or public health engineer with health department. E380

NEWS FROM THE FIELD

FEDERAL HOSPITAL CONSTRUCTION ACT OF 1940

THE Senate Committee on Education and Labor, after consideration of the bill originally known as "the National Hospital Act of 1940" (S. 3230), as introduced by Senators Wagner and George (see *A.J.P.H.*, March, 1940, p. 312, and April, 1940, p. 455), and now known as "the Hospital Construction Act of 1940," has reported favorably on the Act as amended, and recommends that this bill should pass.

In effect the amended bill is a substitute for the original and provides for a limited program of hospital construction and equipment and for assistance toward the maintenance of these hospitals. It includes an authorization for the use of not more than 2 per cent of the appropriations for training of personnel necessary for these hospitals. An appropriation of 10 million dollars is authorized for the fiscal year ending June 30, 1941, and the same amount for each of the 5 ensuing fiscal years. The only amounts authorized to be appropriated thereafter for such hospitals are for their necessary maintenance over a 5 year period after construction, but not longer.

S. 3230 as amended provides that the first year's appropriation would be for construction by the Federal Works Agency of hospitals for states and political subdivisions. These hospitals would be leased to the state or subdivision, but the hospital would be given to the lessee whenever it was demonstrated that the hospital could be operated successfully, and the transfer would be mandatory at the end of 5 years of successful operation. Subsequent appropriations for the succeeding 5 years are to be used for grants-in-aid to states or political subdivisions for construction and maintenance of hospitals. These grants would vary, depending upon the financial situation of the state, from 25 to 90 per cent of the total cost of the project, exclusive of the site.

As amended, the bill provides for the submission by states to the Surgeon General of the U. S. Public Health Service of plans showing the existing hospitals and of the need for additional facilities. A 9 member National Advisory Hospital Council is provided for, with the Surgeon General as Chairman, together with 8 members to be selected from leading medical or scientific authorities outstanding in matters pertaining to hospitals or other public services.

In the reporting of the bill, Senator Murray stated that the committee recognized that this program is only a step toward the solution of the health problems which have received attention for the past several months, but that it would provide increased hospital facilities in localities where the need is most desperate. He stated that it was the opinion of the committee that this measure should be immediately adopted because of the pressing necessity of the situation, and he stated that this measure was designed so as to fit into a more comprehensive program which is being formulated by the Committee on Education and Labor.

Senator Murray also pointed out that it had developed in the course of the hearings on this legislation that the

support for the basic purposes of the bill was practically unanimous. The committee had availed itself of several suggestions and believes that the bill as reported meets the objections and incorporates the helpful suggestions which it has received.

Concluding, Senator Murray states "your committee has approved the bill because it accepts the premise that it is a function of government to preserve the person as well as the property of man, and that in the final analysis there can be no national progress except through promoting the health and welfare of the citizens of the Nation." (The report covering the bill as amended is No. 1558.)

PHARMACISTS IN THE VENEREAL DISEASE PROGRAM

THE following resolution was passed by the American Social Hygiene Association and read at the first meeting held in New York recently of the Joint Committee of the American Social Hygiene Association and the American Pharmaceutical Association:

WHEREAS, the one hundred and twenty-five thousand pharmacists in the United States are in a position greatly to aid the program for combating syphilis and gonorrhea; and

WHEREAS, there are many strong reasons for enlisting their active friendly coöperation in the present nation-wide campaign against these diseases:

BE IT RESOLVED: That the American Social Hygiene Association and the American Pharmaceutical Association be requested to consider the designation of two members each of a joint committee empowered to select a fifth member, and to add Dr. Walter Clarke, executive director of the American Social Hygiene Association, and Dr. E. F. Kelly, director of the Institute of Pharmacy; such committee to be authorized to plan and promote coöperation and activities in accordance with the purposes of this resolution.

BE IT RESOLVED further that, in developing the work of this committee, the following activities should be considered:

(a) To carry on education activities for the instruction of pharmacists through their professional schools, professional meetings, and professional periodicals, and in such other ways as may appear to the joint committee to be practicable.

(b) To draw pharmacists into participation in the education of the public through the many opportunities afforded by drug stores.

(c) To encourage pharmacists to direct all persons who may have syphilis and gonorrhea to the proper sources of diagnosis and treatment.

(d) To study the problems surrounding the ethical and legal aspects of distribution and control of drugs and patent remedies used in the self-treatment of syphilis and gonorrhea.

(e) To seek the collaboration of other groups, especially the American Medical Association, the United States Public Health Service, and the Federal Bureau of Food and Drugs.

Immediate plans were set up to keep the pharmacists informed about the venereal disease program by distributing information through pharmaceutical and medical publications. Presidents of all State Pharmaceutical Associations were urged to present resolutions at their state conventions in support of this program.

BUENOS AIRES TUBERCULOSIS HOSPITAL

THE Hospital Nacional Central, at Buenos Aires, Argentina, formerly a military hospital, was dedicated February 18.

Dr. Antonio Cetrangolo was appointed as its head and an extensive staff of associates provided for. Prof. A. Ceballos was selected as Director of the Surgical Division.

It contains 600 beds. Several new pavilions have been added to the old building. One of these is intended for surgery and contains 120 beds. The hospital will coördinate the dispensaries scattered over the country, and will remain under the control of the federal department of public health until the National Tuberculosis Commission, created by law, begins to function. It is intended for male patients only.

AMERICAN MUSEUM OF HEALTH ELECTS OFFICERS

THE American Museum of Health announces the election of officers as follows:

President—George McAneny
Vice-President—Frederick Osborn
Chairman of Board of Directors—Louis I. Dublin, Ph.D.
Secretary—Homer N. Calver

Dr. Victor G. Heiser was elected to the Board of Directors, which now consists of:

Victor G. Heiser, M.D.
George Baehr, M.D.
Malcolm Goodridge, M.D.
Seth Milliken, M.D.
David J. Kaliski, M.D.
George Vincent, Ph.D.
Sam Lewisohn

John L. Rice, M.D., and Mayor Fiorello H. LaGuardia are ex-officio members of the Board.

FIVE-DAY PLAN FOR SYPHILIS TREATMENT

ON April 12 a conference of about 200 public health officials from cities east of the Mississippi met in New York City at the call of Dr. John L. Rice, City Commissioner of Health, to discuss a 5 day treatment for syphilis.

By means of a continuous intravenous drip method a massive dose of mapharsan is given over a period of 5 days, during which about 1 gram of the drug is administered, diluted in about 10 liters of solution.

In 1931, Dr. Harold T. Hyman and Dr. Samuel Hirshfeld reported that untoward effects following the treatment of cases of syphilis were often the result of so-called "speed shock" due to the suddenness of the injection. They showed that, if the rate of injection was slowed, large amounts of drugs could be introduced without harming an animal. Since 1933, at Mt. Sinai Hospital, New York, N. Y., 376 men and 1 woman with early syphilis have been treated with arsenical preparations by this method. The cases have been followed with studies at the New York Hospital and at Bellevue Hospital. Of this series it was reported that 85 per cent had shown no recurrence of the disease after a single 5 day treatment.

Summarizing the opinion of the committee in charge, Dr. George Baehr stated that it is the opinion of the committee that the results warrant employment of this technic in other well organized hospitals. He said that the technic could not be recommended for general adoption until a larger volume of experience has been accumulated under careful hospital supervision and the necessity for supplementary therapeutic agents has been determined.

MEDICAL SOCIETY OF THE STATE OF NEW YORK ELECTS NEW OFFICERS

AT the 134th annual meeting of the Medical Society of the State of New York, held at the Waldorf-Astoria Hotel May 7, Dr. James M. Flynn, of Rochester, N. Y., was elected President, and Dr. Samuel J. Kopetzky, of New York, was named President-elect to take office at the next annual meeting.

The women's auxiliary of the society elected Mrs. Luther H. Kice, of Garden City, N. Y., President, succeeding Mrs. C. Scott Towne, of Saratoga Springs, N. Y.; and Mrs. George B. Adams, of Auburn, N. Y., President-elect.

HEALTH EDUCATION SYMPOSIUM

THE Joint Committee on Health Problems in Education of the National Education Association and the American Medical Association will sponsor a Symposium on Health Problems in Education in connection with the Annual Meeting of the American Medical Association to be held in New York. The date of the Symposium is June 11, at 2:00 P.M. It will be held in the Grand Ballroom of the Hotel Roosevelt, New York, N. Y.

PERSONALS

Eastern States

MORTON H. CHAPNICK, M.D., has been appointed Health Officer of the Town and City of Putnam, Conn.

DR. NEWTON W. HERSHNER, of Mechanicsburg, Pa., has been appointed Medical Director of Cumberland County, succeeding DR. EDWARD S. BERRY, of Shippensburg.

JOHN H. KORNS, M.D.,† has resigned as Director of the Bureau of Tuberculosis in the Cattaraugus County Department of Health, Olean, N. Y., to accept a similar position with the Westchester County Department of Health, White Plains, N. Y.

Southern States

DR. CARROL T. BOWEN, of Miami, Fla., has been appointed in charge of the Division of Venereal Disease Control of the Duval County Health Unit.

R. R. SAYERS, M.D.,* Senior Surgeon, U. S. Public Health Service, Washington, D. C., in charge of the office of Industrial Hygiene, has been detailed by the President to be Acting Director of the Bureau of Mines, U. S. Department of Interior, succeeding DR. JOHN W. FINCH.

Western States

ELMER F. CHAFFEE,† of Boise, Idaho, has been elected Secretary of the Idaho Public Health Association, succeeding HARVE J. CARLSON,† who is studying public health at the University of Michigan.

LAWRENCE J. PETERSON, B.S.,* Director of Laboratories, Division of Public Health, Boise, Idaho, has been elected representative to the Governing Council of the American Public Health Association from the Idaho Public Health Association.

FOREIGN

DR. JOSÉ ARCE, Dean of the Medical School at Buenos Aires, Argentina, is making a tour of the United States, visiting outstanding hospitals and medical schools, after conferring with officials of the U. S. Public Health Service in Washington.

PROF. W. H. HOFFMANN, of the Finlay Institute, Havana, Cuba, has been elected a member of the Academia Columbiana de Ciencias in Bogota.

DEATHS

LEWIS V. CARPENTER,* Professor of Sanitary Engineering at New York University, New York, N. Y., died May 10, at the age of 45.

HENRY WIREMAN COOK, M.D.,† of Minneapolis, Minn., died April 25. He was Vice-President and Medical Director of the Northwestern National Life Insurance Company.

HERBERT R. FLINT, M.D., of Hornell, N. Y., died recently.

FREDERICK G. METZGER, M.D.,† Health Officer of Carthage, N. Y., died recently.

* Fellow A.P.H.A.
† Member A.P.H.A.

CONFERENCES AND DATES

American Association of Industrial Physicians and Surgeons—25th Annual Meeting. In conjunction with First Annual Meeting of American Industrial Hygiene Association. Hotel Pennsylvania, New York, N. Y. June 4–7.

American Association of Public Health Dentists. Cleveland, Ohio. September 8–9.

American Dental Association. Cleveland, Ohio. September 9–13.

American Dietetic Association — 23rd Annual Convention. Pennsylvania

Hotel, New York, N. Y. October 21–24.

American Heart Association. Scientific Meeting. Hotel Roosevelt, New York, N. Y. June 7–8.

American Home Economics Association —33rd Annual Meeting. Cleveland, Ohio. June 23–27.

American Hospital Association. Boston, Mass. September 16–20.

American Medical Association — 91st Annual Meeting. Waldorf-Astoria Hotel, New York, N. Y. June 10–14.

American Medical Women's Association. New York, N. Y. June 9–10.

American Public Health Association —69th Annual Meeting. Book-Cadillac Hotel, Statler Hotel, Detroit, Mich. October 8–11.

American Rheumatism Association. New York, N. Y. June 10.

American Society of Civil Engineers. Summer Meeting. Denver, Colo. July 24–26.

American Society of Clinical Pathologists. New York, N. Y. June 10.

American Society of Planning Officials. National Conference on Planning, in coöperation with American Institute of Planners, American Planning and Civic Association, and National Economic and Social Planning Association. San Francisco, Calif. July 8–11.

American Therapeutic Society. New York, N. Y. June 7–8.

American Water Works Association—

New York Section — Ithaca Hotel, Ithaca, N. Y. June 6–7.

Michigan Section — University of Michigan Union, Ann Arbor, Mich. September 11–13.

Rocky Mountain Section — Cosmopolitan Hotel, Denver, Colo. September 16–17.

Western Pennsylvania Section — Castleton Hotel, New Castle, Pa. September 18–20.

Southwest Section — Mayo Hotel, Tulsa, Okla. October 14–17.

New Jersey Section — Atlantic City, N. J. October 18–19.

Kentucky-Tennessee Section — Lafayette Hotel, Lexington, Ky. October 21–23.

California Section—Los Angeles Biltmore Hotel, Los Angeles, Calif. October 23–26.

Minnesota Section—St. Paul Hotel, St. Paul, Minn. November 7–8.

Association for the Study of Internal Secretions. New York, N. Y. June 10–11.

Association of American Medical Colleges. Ann Arbor, Mich. October 28–30.

Building Officials Conference of America. St. Louis, Mo. June 3–6.

Canadian Public Health Association—29th Annual Meeting. Winnipeg, Man. September 23–28.

Citizens' Conference on Government Management. University of Denver. Estes Park, Colo. June 17–22.

Conference on Health and Physical Education. University of Denver, Denver, Colo. June 24–26.

Dairy Industries Supply Association. Atlantic City, N. J. October 21–26.

Federation of Sewage Works Associations—First Annual Convention, in conjunction with the 1940 Annual Meeting of the Central States Sewage Works Association. Hotel Sherman, Chicago, Ill. October 3–5.

Florida Public Health Association. Tampa, Fla. December.

Health Officers and Public Health Nurses—Annual Conference. Under the Auspices of the New York State Department of Health. Saratoga Springs, N. Y. June 24–27.

Indiana State Medical Association. French Lick Springs Hotel, French Lick, Ind. October 29–31.

Institute of Food Technologists—First Meeting. Morrison Hotel, Chicago, Ill. June 17–19.

Institute of Government. University

of Southern California, Los Angeles, Calif. June 10–14.

Institute on Maternal and Infant Hygiene—for registered nurses. University of California, Berkeley, Calif. July 1–20.

International Association of Milk Sanitarians. Joint Meeting with the New York State Association of Dairy and Milk Inspectors. Hotel Pennsylvania, New York, N. Y. October 17–19.

International Congress on Rheumatism—7th. New York, Boston, and Philadelphia. June 1–10.

Interstate Post-Graduate Medical Assembly. Cleveland, Ohio. October 13–19.

Medical Library Association — 42nd Annual Meeting. University of Oregon Medical School, Portland, Ore. June 25–27.

Michigan Public Health Association. Detroit, Mich. October 8–11.

Montana Public Health Association. Bozeman, Mont. June 17–18.

National Association of Coroners. Hotel Adelphia, Philadelphia, Pa. August 26–28.

National Association of Purchasing Agents—Governmental Group. Cincinnati, Ohio. June 3–6.

National Chemical Exposition—sponsored by the Chicago Section of the American Chemical Society. Stevens Hotel, Chicago, Ill. December 11–15.

National Education Association. Milwaukee, Wis. June 30–July 4.

National Gastroenterological Association — Fifth Annual Convention. Hotel Roosevelt, New York, N. Y. June 4–6.

National Restaurant Association. Chicago, Ill. October 7–11.

National Safety Council. Chicago, Ill. October 7–11.

National Tuberculosis Association — 36th Annual Meeting. Hotel Statler, Cleveland, Ohio. June 3–6.

New Mexico Public Health Association. Albuquerque, N. M. June 20–22.

New York State Conference of Mayors and Other Municipal Officials. Rochester, N. Y. June 10–12.

Pacific Northwest Medical Association. Spokane, Wash. June 26–29.

Pennsylvania Sewage Works Association—14th Annual Conference. State College, Pa. June 26–28.

School Health Education Conference. Sponsored by the California State Departments of Education and Public Health. University of California, Berkeley, Calif. July 22–25.

Schoolmen's Conference—on "Facing Youth Problems." New Jersey State Teachers College, Montclair, N. J. July 11–12.

Society of American Bacteriologists. St. Louis, Mo. December.

Special Libraries Association. Claypool Hotel, Indianapolis, Ind. June 3–6.

Symposium on Clinical Experience in Nursing. Catholic University of America, Washington, D. C. June 26–27.

Symposium on Health Problems in Education. Sponsored by the National Education Association, and the American Medical Association, in connection with the annual meeting of the American Medical Association (June 10–14). Hotel Roosevelt, New York, N. Y. June 11—2:00 P.M.

Texas Public Health Association. Fort Worth, Tex. September 30–October 2.

Tri-State Conference of Food and Health Officials. Pittsburgh, Pa. October.

Western Branch, American Public Health Association — 11th Annual Meeting. Denver, Colo. June 24–27.

Foreign

Pan American Congress of Tuberculosis—Fifth. Buenos Aires, and Cordoba, Argentina. October 13–17.